THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTERWORLD

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Software comes of age
Special Report on applications packages
Follows ID/16

Chip dip
No quick recovery/**75**

In Depth
Thou shalt not dupe
Follows 50

In Depth
Flat panels: A new face for terminals
ID/11

Strategy helps bank tackle graphics boom

Production, training key to DP division's efforts to deal with user demand

By David Olmos
CW Staff

LOS ANGELES — With users beating down the door for computer-generated graphics, managers at Security Pacific Automation Co. are focusing on two concerns — production and training — in an effort to enhance graphics use within the organization.

"It's almost a chicken-and-egg situation," explained Jan Schwartz, an assistant vice-president of the information center at Security Pacific. "You need to have the facilities to produce graphics, but you also need to know how to do it. You can't have one without the other."

Security Pacific is a division of Security Pacific National Bank, the nation's eighth largest bank, with headquarters here. Last September, the bank's DP group was spun off as a separate division and named Security Pacific Automation. The new division continues to serve the DP needs of the bank but also hopes to market its services to outside financial institutions.

As elsewhere throughout corporate America, the growth of graphics at Security Pacific has closely followed the proliferation of microcomputers.

In a recent interview here, Security Pacific managers said they placed a microcomputer atop the desk of bank President George Moody three years ago, and he has

See **GRAPHICS** page 8

Prime unveils supermini

Unit bests 9950's performance by average of 60%; Series 50 users offered IBM SNA compatibility

By Donna Raimondi
CW Staff

NATICK, Mass. — Prime Computer, Inc. has become the first major superminicomputer vendor to counter Digital Equipment Corp.'s VAX 8600 processor announced in early November. Prime last week unveiled the 9955, which supersedes its older 9950 processor and costs roughly 7% less than the older machine.

The 9955 is said to offer an average of 30% to 60% — and up to 90% in certain applications — more performance than the 9950. Prime claims the new processor yields approximately the same performance as DEC's 8600.

In announcing the 9955, Prime also fulfilled a two-year-old promise to provide users of its Series 50 superminis with IBM Systems Network Architecture compatibility. The firm also announced Prime/SNA, three separately priced communications software packages said to allow Prime users to coexist with SNA environments, and the PT200 CRT terminal, designed to take advantage of the newly announced SNA capabilities and offer optional graphics functions (see story page 7).

The bulk of the 32-bit 9955's added performance comes from a combination of expanded cache memory and faster emitter-coupled logic circuitry. Prime expanded the earlier 16K-byte cache memory capacity on the 9950 to 64K bytes on the 9955.

The newly announced model offers the same main memory capacity as the 9950 — 4M to 16M bytes — and uses the same 80-nsec CPU cycle time. Available immediately, the 9955 uses Prime's Primos Revision 19.4 operating system, which supports the SNA compatibility and new features of the instruction set. The system is said to be fully compatible with other

See **PRIME** page 6

TOP OF THE NEWS

Going up? AT&T filed for a $260 million annual rate increase that would affect large-volume users first and foremost. **Page 2.**

■

Britton Lee, Inc. rolled out three data base machines capable of handling multi-gigabyte data bases. **Page 4.**

■

Plunging into the crowded office automation market, Apple Computer, Inc. unveiled a series of products based on its Macintosh micro. Analysts, meanwhile, said they feel Apple still has a way to go before it can compete with the OA leaders. **Page 15.**

■

Control Data Corp. expanded its Cyber system's memory with three processor models. CDC also added a streaming tape subsystem to its Certainty family of IBM Series/1-compatible peripherals. **Page 59.**

■

Engineering relief. Users who have endured slow response times from minicomputer-based CAD systems will welcome the expected arrival of low-cost CAD systems based on the IBM Personal Computers XT and AT. **Page 65.**

FYI

'Spaghetti code' glut spawns program restructuring services

By Paul Gillin
CW Staff

Some people call it "spaghetti code."

You might call it your payroll system.

Whatever its name, you are talking about an old, unstructured program, probably written in Cobol between 10 and 20 years ago. Over time, it has been patched to the point that the logic is unintelligible. A single change to the code could add hundreds of new paths to the program. And finding a bug could simply be a lost cause.

There are thousands of programs like this in use today. In many cases, they are the backbone of a firm's operations. As a result, DP shops hesitate to make any substantive changes to or rewrites of the programs, despite the availability of structured techniques that improve program readability and reliability.

But an alternative is now emerging: services that take old, patchwork programs and rewrite them into new structured code. The services do not promise to eliminate bugs that already exist. In fact, the code they produce is intended to perform exactly as the old program performed. But because the programs are struc-

See **CODE** page 10

CW photo by J. Gallant

Big dealings in Big D

Dallas played host to a Texas-size computer industry get-together last week featuring the opening of Infomart, the first permanent high-tech exhibition/market facility, and the 1985 Uniforum International Conference of Unix Users. See stories pages 11-14.

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NEWSPAPER

NEWS

AT&T asks $260 million, 8.6% rate hike on private lines

By Bryan Wilkins
CW Washington Bureau

WASHINGTON, D.C. — AT&T is seeking an average 8.6% rate increase for its private-line customers through a rate restructuring that will raise rates for voice-grade service but drop them substantially for T1 facilities and large-volume communications users. The proposed rate increases total about $260 million in additional charges annually.

AT&T filed the proposed tariff changes Jan. 18 with the Federal Communications Commission and asked to have them take effect March 4. AT&T said in the tariff filing the "effect [of the increase] on individual customer groups will vary depending upon the particular mix of services they use." AT&T is seeking to unbundle its rates to reflect both the charges AT&T pays the local phone companies for local interconnect and, separately, the long-distance costs accruing to AT&T. Such an unbundling would give large-volume users more detailed information on the cost of local access that they could use to assess bypass possibilities.

"The tariffs make a distinction between the AT&T interoffice networks and access to that network. . . . The access-based elements are separated from the interoffice elements. The access rates reflect the rates in the [local] exchange carriers access tariffs, while the rates for interoffice components are based on AT&T's costs," the company said in its filing.

The private-line rate restructuring will affect different categories of private-line service such as voice-grade, where costs would rise an average of 11%; Dataphone Digital Service (2.4K to 56K bit/sec), where costs would increase an average of 30%; and Accunet T1.5 service, where costs would be reduced an average of 9% to 13%. Group and Supergroup services, the equivalent of 60 voice-grade channels, would realize an average cut of 7% to 60%, and wideband services would face an average increase of 22%, AT&T said in the filing.

The rate restructuring splits the rate elements of AT&T's private-line service into three tariffs.

- Tariff No. 9 contains the rates and regulations for service provided among AT&T central offices, central office functions, channel options and the type of customer connection to the central office.
- Tariff No. 10 contains the mileage band rates for private-line service between central offices.
- Tariff No. 11 contains the rates and regulations for AT&T-provided private-line local channels for local distribution of traffic.

As an illustration of the new structure, AT&T noted, "The tariffs do not have interconnection restrictions. Customers can obtain end-to-end services from AT&T by ordering local channels from Tariff No. 11 and for connections to interoffice services from Tariff No. 9. When customers choose to order service components that way, they will be able to continue to obtain a total service whereby AT&T assumes full responsibility for all functions and end-to-end service.

"Customers will also be able to secure access independently for use with AT&T services and will have the further flexibility of having AT&T provide either access coordinating functions or only a basic connection," the filing added.

AT&T PROPOSED PRIVATE-LINE SERVICE RATES

Class	Central Office Connection: Installation	Central Office Connection: Monthly	Interoffice Channel	Local Channel	Installation
Voice Grade					
A	$218	$ 29	$55.25	$82.76	↑
B	$ 78	$ 20	to	to	$296
C	$ 78	$ 20	$280.25	$121.13	↓
DDS* 2.4K to 4.8K bit/sec					
A	$358	$ 62	$75.25	$174.58	↑
B	$148	$ 35	to	to	$358
C	$296	$202	$300.25	$205.89	↓
DDS* 56K bit/sec					
A	$484	$ 77	$285	$288.29	↑
B	$224	$ 50	to	to	$484
C	$448	$238	$1,325	$359.52	↓
Accunet T1.5					
A	$500	$ 81	$400	$480.88	↑
B	$300	$ 60	to	to	$900
C	$300	$ 60	$1,400	$586.21	↓
Wideband/Group/Supergroup					
A	$145	$ 40	$160	Local channel costs from local exchange	
B	$100	$ 27	to		
C	$100	$ 27	$3,500		

* Dataphone Digital Service

CW CHART

IBM stripped of contract

WASHINGTON, D.C. — The U.S. Immigration and Naturalization Service has transferred a major portion of a $99.5 million computer contract from IBM to Electronic Data Systems Corp. (EDS) as the result of allegations that a secret, late-night meeting between IBM and agency officials gave IBM an edge in its bidding battle with EDS last May.

In an out-of-court settlement, the agency agreed to give EDS, now a subsidiary of General Motors Corp., $91.5 million of the contract that was awarded last summer to IBM, an agency spokesman said last week.

EDS, which won a preliminary court injunction blocking the IBM contract, charged the agency with "bias and favoritism" after it learned that a May 10 "closed-door, after-hours meeting" was held and that IBM subsequently reduced its final bid by $3.3 million, thus undercutting the EDS bid by $2,713 [CW, July 16].

A spokesman for the immigration agency, denying that the meeting was improper, said the agency officials informed IBM that it had mistakenly read the bid solicitation document as requiring 12,000 computer terminals rather than the 8,500 actually needed. The spokesman added that EDS will have to buy the computer hardware from IBM.

Drop a dime

Hard as we try to give our readers the most complete information available, some good news and feature stories never reach us.

Are you involved in an unusual application of DP technology in your firm? Know any unsung heroes? Heard any hot vendor news?

If so, we'd like to hear from you. *Computerworld* has established a reader hot line for items of interest to the computing community. Call us toll free at (800) 343-6474. Ask for Donovan White, assistant managing editor. We can't be everywhere — but our readers are.

CORRECTIONS

In the Dec. 31/Jan. 7 Forecast issue, "Qualified programmers, analysts difficult to find" incorrectly identified Atlantic Aviation Corp. of Wilmington, Del., as General Aviation Sales and Service.

A Dec. 17 *Computerworld* report on a legal battle in which IBM is charging NCR Comten, Inc. — an NCR Corp. subsidiary — with copyright infringement incorrectly stated the main issue as the disclosure to IBM of an NCR Comten program by Evergreen Consulting, Inc. NCR Comten withdrew in 1983 a breach of agreement suit against Evergreen; currently pending is a separate suit by Evergreen charging NCR Comten with defamation, trade libel and other actions.

NEWS SUMMARY

SPECIAL REPORT
Applications packages
Follows ID/16

Britton Lee, Inc. introduced three turnkey data base machines designed for a variety of applications and capable of handling multigigabyte data bases/**4**

Software AG of North America, Inc. has announced a front end to its Natural applications development language that allows nontechnical users to write Natural programs/**4**

Prime's 9955 superminicomputer was given positive reviews by industry analysts/**6**

A large California bank that has been beta testing a new graphics tool for IBM mainframe users has given the product a favorable review/**8**

CW at Uniforum: AT&T Unix's greatest strengths are also its greatest weaknesses, according to users . . . Enhancements led the parade of small-systems product announcements . . . In the large-systems arena, enhancements were also foremost . . . What does the future hold for Unix? A variety of industry watchers gave their answers/**11-14**

Apple Computer, Inc.'s recent announcement of the Macintosh Office also revealed Apple's plans to discontinue all but one model of the Lisa line/**15**

Industry watchers believe that the Macintosh Office will help Apple establish a beachhead in the IBM-dominated corporate marketplace/**16**

A former DP official at the Social Security Administration was found guilty of bribery/**17**

Corporate information executives will be stalking the rare programmer and systems analyst in 1985, a recent Data Processing Management Association survey indicated/**18**

The University of Colorado has released its annual bibliography of computer-related books/**19**

Next year, incoming foreign banks will strip Australian financial institutions of their DP staff, forcing an increase in salaries, according to an Australian firm's DP salary survey/**26**

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Britton Lee unwraps trio of data base machines

LOS GATOS, Calif. — Britton Lee, Inc. has broadly extended its line of turnkey data base machines with the addition of three models capable of handling multigigabyte data bases.

Britton Lee's Intelligent Database Machine (IDM) 500 series consists of three systems — the IDM 500E, 500X and 500XL. The systems are based around Britton Lee's IDM 500, a specialized multiprocessor computer designed to execute the relational data base management system (DBMS) model. IDM operates in a multihost environment allowing a variety of host systems to communicate with IDM via host-interface modules.

The most powerful of the three turnkey systems announced by Britton Lee is the 500XL. More than 400 users can access the system's more than 1G byte of Winchester disk capacity. The 500XL comes with 2M bytes of random-access memory (RAM).

The spokeswoman said that an 8 million instructions per pecond (Mips) accelerator is included for applications that require repetitive data base operations. The accelerator is said to improve system performance as much as 10 times. A 500M-byte cartridge tape drive can be used for archiving and for host-independent tape backup and, as with the 500X, the 500XL allows for the flexible configuration of any mix of serial I/O, IEEE-488, parallel, Ethernet local-area network or IBM block multiplexer interfaces. The 500XL costs $154,900.

The IDM 500E is described as an entry-level data base machine. It features a high-speed, eight-channel serial I/O that allows up to eight different hosts and 90 users to access a common data pool simultaneously. Bundled with the 500E is 1M byte of RAM and a dedicated 160M-byte disk drive that allows access to the data base without consuming processing resources from the host computer.

An Ethernet interface option enables additional users to access the data base, and a 300M-byte cartridge tape drive can be used for data backup. An expansion slot allows the 500E to be configured to RS-232, IEEE-488 or Ethernet host interfaces. The 500E is priced at $56,900.

The 500X reportedly allows 250 users to access data bases simultaneously that can be stored in the system's 320M bytes of Winchester disk capacity, capable of being expanded to more than 10G bytes.

The 500X is priced at $98,900.

Britton Lee is located at 14600 Winchester Blvd., Los Gatos, Calif. 95030.

Option simplifies Natural language for nontechnical users

RESTON, Va. — Software AG of North America, Inc. last week announced a front end to its Natural application development language that allows nontechnical users to write Natural programs using a series of menus and prompts.

Super Natural generates Natural code but can be learned in a few hours, a company spokesman said. The product uses a series of screens to prompt users through the process of defining data and processes and designing reports. The menu-driven, prompted interface can be bypassed by more experienced users who would rather develop queries in Natural. In addition, users have access to public or private libraries to retrieve, store and modify transactions.

Super Natural also provides a production reporting capability whereby inquiries can be loaded into a production job stream, the spokesman said. Control and security options are provided, with access defined by the system administrator. Multiple output options let users view information from a terminal or micro in either text or chart/graph format.

User-defined files allow users to create files from existing reports or user-entered data, Software AG said. Data integrity, backup and restart/recovery options are included along with multiple file access. Flexible operations provide users with tailored report formats and creation of data fields for calculations.

Super Natural will be marketed as an extension to the company's Adabas data base management system, Natural and Com-Plete, a teleprocessing monitor. The Super Natural option will be available in April at prices of $15,000 for IBM's DOS/VSE operating system, $20,000 for IBM's VM/CMS or OS/VS1 and $25,000 for IBM's MVS and MVS/XA.

Software AG is located at 11800 Sunrise Valley Drive, Reston, Va. 22091.

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Special Report to target micros

The explosive use of microcomputers in corporate America has not been without its problems. The April Special Report on micros in big business will look at both the benefits of microcomputer use in the corporation and the headaches that can sometimes result.

The Special Report will focus on DP/MIS management strategies for integrating micros into the corporate information system, trends in business-related microcomputer hardware and software and the security risks involved in widespread microcomputer use.

Contributions should be tutorial articles discussing an issue or trend or application stories outlining a particular user firm's data base management system experience.

Articles must be typed, double-spaced and range in length from four to six pages. Artwork, such as charts, graphs and photographs, is welcome. Authors should include brief biographies and telephone numbers.

The deadline for submissions to the Special Report is March 5. Contact Janet Fiderio, Special Report Editor, *Computerworld*, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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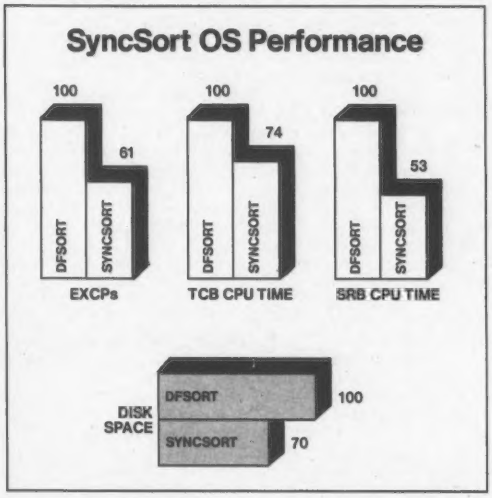

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Prime's 9955 seen direct challenge to DEC's VAX 8600

By Tom Henkel
CW Staff

Prime Computer, Inc. scored several victories last week with its newly announced high-end 9955 superminicomputer. Not only did the company prove it could quickly react to Digital Equipment Corp.'s recently announced high-end VAX 8600 processor, it did so with a competitively priced system that does not require significant technological changes to the existing Prime supermini architecture.

Some industry watchers said they believe the attractive price coupled with the proven technology used in the 9955 may give Prime a slight edge in the developing high-end superminicomputer marketplace.

The 9955 is the most agressively priced system Prime has ever introduced. Peter Lowber, an analyst with the Boston-based Yankee Group market research firm, said Prime's traditional marketing strategy has been to "offer a Cadillac engine and not worry about the price." Now, Lowber said, the 9955, with a purchase price that factors down to roughly $80,000 per millions of instructions per second, may be low enough to entice new users to the Prime fold.

But Lowber was quick to note that by unveiling an attractively priced member of its product line, Prime may have put itself into a catch-22 situation. Lowber explained that Prime will now have to restructure the pricing on the rest of the Series 50 line and may forever give up the relatively high profit margins that have kept the company financially secure in past years. For example, Lowber noted that Prime is not going to turn high profits on the $45,000 upgrade charge to convert older 9950 systems to the 9955 configuration.

By enhancing the performance of its existing processor technology, Prime has been able to get a jump on DEC. The 8600, announced in November [CW, Nov. 5], will not be available until April. Some industry watchers said they believe it will be at least mid-summer before DEC makes volume shipments of the 8600.

"The best thing about [the 9955] is that it is available," noted Dave Moschella, an industry analyst with International Data Corp. in Framingham, Mass. Because it is basically an enhanced version of the 9950, Moschella added, "that means it will probably work." He explained, "The jury is still out on the Venus [the code name for the 8600]" because the system employs a different technology from earlier VAX series systems.

One thing Prime's 9955 does not clear up is the company's strategy in the low-end marketplace. Lowber noted that most companies that compete heavily with Prime in the superminicomputer market, such as DEC and Data General Corp., have unveiled low-end microcomputer products to round out their product lines. So far, Prime has not addressed the low-end market, Lowber said.

While the 9955 fails to clear up all the questions about Prime's future strategy, the announcement clearly sets the stage for what many analysts believe will be a high-end supermini sweepstakes during the next few months. Now, Lowber said, the pressure is on DG to match or to exceed both DEC's and Prime's newly announced products. Other vendors in the supermini marketplace are expected to follow suit.

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members of the 50 series. Current users of the 9950 can field-upgrade to the 9955 configuration for $45,000 after April 1. Users of smaller 50 series processors can also migrate to the 9955 for between $177,000 and $327,000, the vendor said.

The 9955, like the older 9950 and 9750 processors, features a five-stage pipelined architecture that provides overlapped instruction execution and allows five instructions to be in some stage of execution concurrently.

This design reportedly permits overlap of cache access, instruction decode, effective address formation, virtual memory mapping and instruction execution. The system 9955 supports up to 254 directly connected terminals and also supports up to 10G bytes of storage.

Expandable main memory

The new system's main memory is expandable from the basic 4M bytes to 16M bytes in 2M-byte increments. The main memory features high-density, 64K-byte MOS semiconductors. Memory array boards interface to a memory controller — considered part of the CPU — that performs all common timing and error checking and correction functions for the memory. The new system provides soft error recovery, enabling the CPU to detect parity errors in the cache and reload from main memory.

A 64K-byte cache memory is said to have a 40-nsec access time, and by providing the CPU with the required instructions more than 98% of the time, it has a 58-nsec effective main memory access time, the vendor said. The 9955 is also said to feature four times the branch cache capacity of the Prime 9950.

The 9955 instruction set is a compatible superset of the standard Prime 50 series instruction set. User programs written for any Prime system can run on the system 9955 without data conversion or relinking, the vendor said.

According to the vendor, a major feature of the newly announced instruction set is quad-precision floating point in which the mantissa has been expanded to 96 bits from the 48 bits available with double-precision floating point.

Prime's Fortran compiler, F77, has been enhanced to support quad-precision floating point. Any Prime 50 series system can emulate quad-precision floating point by automatic invocation of software routines. The floating-point acceleration hardware enables the 9955 to perform multiplications in less than one-half the time required by the 9950, the vendor said.

Ring network option

For local-area networks, the 9955 can be attached in a high-speed Prime Ringnet network with any other 50 series system. The ring provides intersystem communications via a coaxial cable or fiber optics for systems using Primenet software and a Primenet node controller.

The 9955 supports all Prime communications hardware controllers and most popular communications protocols including IBM's binary synchronous and X.25 packet-switching networks.

The 9955 — which uses the same cabinet as the 9950 — has a five-board CPU, which is said to require less electricity and air conditioning than the 17-board DEC VAX 8600.

The vendor said the price of the Prime 9955 processor and 4M bytes of main memory is $321,000. The price of a typically configured system — including a 9955 processor with a 4M-byte main memory, two 315M-byte fixed media disks with one controller, a streaming magnetic tape subsystem, one peripheral cabinet and a CRT console — is $371,000.

Prime is located at Prime Park, Natick, Mass. 10760.

PRIME COMPUTER, INC.

System	Series 50 9650	Series 50 9750	Series 50 9955
Relative Performance[1]	52	101	229
Mips[2]	.9	1.75	4
Memory size in bytes (Minimum-Maximum)	2M-8M	4M-12M	4M-16M
Purchase Price[3] (Memory Size)	$145,500 (2M)	$250,500 (4M)	$371,000 (4M)
Lease Price (Lease Term)	$3,419 (5 Year)	$5,885 (5 Year)	Not Available
Machine Cycle Time (Nsec)	160	100	80
Channels (Minimum-Maximum)	1-10	1-10	1-14
Cache (Buffer) size	16K	16K	64K
Bus Architecture?	No	No	No
Price per 1M byte[4] of main memory	$10,500	$7,550	$7,550

1. CW estimates based on vendor-supplied information. Relative performance ratings are based on an IBM 370/158-3 equaling 45. These numbers do not constitute a buyer's guide.
2. Vendor claims.
3. Purchase price includes central processor, diagnostic processor, cabinet, chassis, Primos operating system and minimum disk/tape configuration.
4. Purchase price for add-on memory.

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Prime VDT, software give IBM mainframe link via SNA

By Tom Henkel
CW Staff

NATICK, Mass. — In addition to announcing the high-end 9955 superminicomputer last week, Prime Computer, Inc. also unveiled a CRT terminal and communications software that allow users of Prime superminis to communicate with IBM mainframes via IBM's Systems Network Architecture (SNA).

Collectively called Prime/SNA, the communications products can reportedly be run on any Prime Series 50 system and consist of three separately priced parts: the Prime/SNA Interactive Subsystem, the Prime/SNA Remote Job Entry (RJE) Subsystem and the Prime/SNA Server Subsystem. The communications products are said to allow users to communicate with IBM host processors while maintaining compatibility with Prime data communications software.

The Prime/SNA Interactive Subsystem is said to provide a subset of the SNA capabilities offered by IBM's 3274 control unit, 3278 terminal and 3287 and 3289 printers.

The availability of these features, Prime said, means that users of the newly announced Prime PT200 CRT terminal can access IBM host processors and applications as though they were using an IBM 3278 terminal.

SNA, Primos switch

Furthermore, Prime claimed that its software allows users to switch back and forth between IBM SNA applications and those running under Prime's Primos operating system. A session suspension and recovery feature is said to allow the user to temporarily interrupt work on an IBM application, return to the Primos environment to run an application and then resume processing the IBM application. According to Prime, users can suspend work on up to three IBM applications without disconnecting from the IBM host.

The Interactive Subsystem costs $5,500 plus a $65 monthly maintenance fee, the vendor said.

The Prime/SNA RJE Subsystem allows Prime users to emulate an IBM 3776 Model 3 RJE workstation in an SNA network. A multiple logical unit feature allows multiple data streams to flow simultaneously between a Prime system and an SNA host over dedicated or shared lines. When used with Prime's networking product Primenet, multiple systems connected via Primenet can send data to and receive information from an IBM host using the RJE Subsystem, a Prime spokesman said.

The package costs $5,500 plus a monthly $65 maintenance fee, the vendor said.

Prime/SNA Server Subsystem

The Prime/SNA Server Subsystem supports both the interactive and RJE subsystems by providing the capabilities of an SNA Physical Unit Type 2 secondary IBM Synchronous Data Link Control (SDLC) station. The Server Subsystem executes within the Prime host processor as well as within Prime's Intelligent Communications Subsystem Model 2 (ICS2) communications processor, which can be enhanced to support binary synchronous communications for $3,400.

The host-based portion of the package provides the common SNA interface for Prime/SNA Interactive and RJE subsystems. The ICS2-based portion provides the SDLC interface to SNA. The Server Subsystem is capable of supporting multiple simultaneous sessions over multiple SDLC links.

The subsystem costs $6,000 and carries a $105 monthly maintenance fee.

The Server and Interactive subsystems will be available in April; the RJE subsystem will be available in the fourth quarter, a spokeswoman said.

Prime said its communications software currently supports IBM's MVS/SP operating system, ACF/Vtam, ACF/Network Control Program/VS, Network Communications Control Facility, Network Problem Determination Application, CICS/OS/VS and TSO-ISPF/PDF.

Support for Prime/SNA

Also announced was the Performer Terminal 200 (PT200). Said to provide built-in support for the Prime/SNA communications products, the asynchronous terminal reportedly costs 20% less than its predecessor, the PST100.

The PT200 offers users a combination of four display formats, a choice of amber, green or black-and-white screens and a keyboard available in nine language options. An eight-color monitor and a graphics board are available as options.

The PT200 terminal is compatible with Prime's OAS office automation product as well as with all 50 series software. The basic terminal costs $995 and is available immediately, according to the vendor. A terminal equipped with an optional color monitor costs $1,695 and will be available in June. An optional graphics card, which offers a 720- by 300-pixel screen resolution and support for Tektronix, Inc. 4010 and 4014 standards, costs $995 and will be available in April.

Prime is located at Prime Park, Natick, Mass. 01760.

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RECOVERY

Early users give IBM mainframe graphics tool thumbs-up

By David Olmos
CW Staff

LOS ANGELES — Security Pacific National Bank, a beta-test site for a graphics tool for IBM mainframe users, is mostly pleased with the product, although somewhat skeptical about the vendor's claim that the program is appropriate for top-level executives.

Security Pacific has been beta testing Issco Graphics, Inc.'s Iviss Manager for several months. Introduced last July, the graphics software program is said to make data from IBM mainframes immediately available in chart form with a single keystroke.

According to Issco marketing personnel, the program's ability to call up charts and produce hard copies of paper charts, overhead transparencies and high-resolution 35mm slides — all at the touch of a button — is a feature that would be valuable for a senior executive.

'Not the way we'll use it'

"I think the product is a very useful one," said Jan Schwartz, an assistant vice-president in the information center at Security Pacific Automation Co., a division of the nation's eighth largest bank. "However, I tend to think that in our environment the way [Issco] is marketing Iviss Manager is not the way we'll use it.

"I don't see our senior vice-presidents sitting down at a terminal and generating graphics," he added. The bank has been running Iviss Manager on its Amdahl Corp. 580 Model 5860 mainframe under IBM's VM operating system.

Schwartz pointed out, however, that few of the bank's senior managers have graphics terminals — an IBM Personal Computer 3270, for example — with the kind of graphics capabilities permitting optimum use of the Issco product. "That's not to say Iviss Manager won't work [for senior executives] at other companies," he said.

Schwartz said he particularly likes the user training features of Iviss Manager. "It has a spreadsheet formula for entering data, which makes it much more user-friendly," he said. "That appeals to us because we can give a tool to our users, and they can very quickly start producing graphs without having to go through an intensive training course."

He said he also likes the program's on-line Help functions and a Make-A-Chart option, which allows "anybody to sit down and generate a chart."

Dick Bertrand, director of IBM products for the San Diego-based software company, said the response from other beta-site users of Iviss Manager has been spectacular.

Aimed at 'highest levels of company'

He said Issco has discussed with other users the issue of whether the program is appropriate for top executives and is standing behind its original marketing claims. "We are definitely aiming at the the very highest levels of the company."

Bertrand asserted that the product will be used by companies whose executives have ready access to graphics terminals.

Deliveries of Iviss Manager are scheduled to begin Jan. 31, Issco said.

GRAPHICS from page 1

shown a special interest in computer-related technologies ever since. "The growth of micros has mushroomed ever since then," said James D. Brandt, vice-president in the interactive computing division.

The number of micros at Security Pacific — predominantly IBM Personal Computers — stands at 1,400 today, with more than 75% of those possessing graphics capabilities. The micro population is expected to grow to more than 2,000 by June.

Security Pacific's information center has more than 80 software packages running on its Amdahl Corp. 580 Model 5860 mainframe employing IBM's VM operating system. Included are graphics packages from such vendors as Evaluation & Planning Systems, Inc.; IBM; Issco Graphics, Inc.; Mathematica Products Group, Inc.; and SAS Institute, Inc.

More than 70% of the company's micros are tied in some fashion to VM. There are about 2,500 users on the time-sharing system, Schwartz said.

One factor that has inhibited wider use of graphics within the bank has been the limited availability of hard-copy devices that could produce high-quality copies quickly.

"I think the biggest problem is not encouraging users to employ graphics but to provide them with the proper tools so that they will use it," noted Judith Koch, an assistant vice-president.

Schwartz added that upper management was supportive of graphics as it became more aware of the tool's benefits. "The executives have been using graphics for a long time," he said, "but they have had to pay to have it done by outside companies at enormous cost."

Last year, Security Pacific surveyed its bank users and found that $10,000 worth of graphics production work was being sent outside the bank each month.

'Continuing explosion' of micros

DuWayne Peterson, chairman of Security Pacific and a long-time MIS professional, said an increasing number of IBM Personal Computer-type workstations are appearing in senior management offices, and "we're seeing a continuing explosion of [personal computers] with graphics going into our branches."

Security Pacific has centralized its graphics production facilities — mainly CRTs and pen plotters — in two areas at its headquarters here and in Glendale, Calif., where users can go to generate graphs without having to purchase costly equipment for their individual departments.

Despite the availability of such equipment, Schwartz said, the main drawback to wider graphics use is related to production. "[Lotus Development Corp.'s 1-2-3 spreadsheet package] is nice to get up a very quick chart on the screen, but what are you going to do with it once it's on the screen?" he asked. "You need a hard copy. You can go to a printer and get a black-and-white, low-resolution copy that's OK to show your neighbor, but it's hard to walk into a management meeting with that."

To get higher quality reproduction, many users have opted for pen plotters selling in the $2,000 to $3,000 range. Pen plotters offer excellent quality but are slow. Schwartz estimated that, on the average, it takes 15 minutes to produce a single hard copy with a plotter. That comes to about $12 a copy when labor and material costs are considered, he noted.

That lengthy process often discourages people from using graphics. As Brandt explained, "If you have a presentation where you have 50 slides, you might just say, 'I'm not going to bother.' "

A recent acquisition that the Security Pacific staff hopes will ease some of the production constraints on graphics is a Xerox Corp. 6500 color copier, which is equipped with a laser graphics interface.

Users 'beating on the door'

"[Users] have been beating on the door to use graphics, and we had no good end-delivery device for them that could create quick, good-quality graphics," Koch said about the decision to purchase the 6500.

Schwartz anticipates that the bank will eventually generate 2,000 to 3,000 charts a month on the 6500 at about $1 a copy.

But good production facilities are useless if users are not properly trained on how to best utilize graphics, Schwartz said.

Security Pacific has tackled the training issue on one front by establishing the in-house Micro Center, which handles personal computer sales, training and consulting for the company.

The Micro Center, located within the bank's headquarters and resembling an average computer retail store, has equipment from a variety of microcomputer manufacturers. There are also two classrooms where regular training sessions are conducted for software and hardware.

"Technology is not the answer to graphics," said Dick Wexelberg, a vice-president in the information center. "There's a whole mind-set that has to be developed on how you present information in graphics form. That requires a great deal of training from a user perspective."

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CODE from page 1

tured, they are easier to maintain and debug, users agree.

Such services are still scattered and relatively new. However, "they are going to be a whole new subindustry," according to T. Capers Jones III, a consultant at Nolan, Norton & Co. in Lexington, Mass. Jones reasoned that the natural aging process of existing programs will have two out of three programmers working on the maintenance of older systems by the end of the century.

The newest service in this area is from Language Technology, Inc., a Salem, Mass.-based company that — for a fee of 50 cents per source line — automatically restructures programs using a series of algorithms and language heuristics.

Eric Bush, chairman of Language Technology and developer of the company's methodology, said that aging, unstructured programs may have thousands of logic paths, hundreds of lines of "dead" or unused code and scores of hidden bugs. Programmers easily become frustrated trying to maintain the poorly documented systems, leading to turnover problems.

In addition, he added, companies often end up employing a staff of software wizards, each supporting one or two programs, simply because they are the only programmers who understand them.

"Old computers go into computer museums, but old software goes into production," Bush said.

> *'Old computers go into computer museums, but old software goes into production.'*
>
> **— Eric Bush, Language Technology, Inc.**

Language Technology will take any unstructured Cobol program and convert it to an end product that is free from GOTOs, ALTERs, fall-throughs and similar program time bombs, Bush said. The documentation it generates includes a program architecture description and a structured flowchart. An early user of Language Technology's system, Unionmutual Life Insurance Corp. in Portland, Maine, has been satisfied with the service. Rachel Stamieszkin, a senior programmer/analyst, said Unionmutual submitted programs of 800 and 3,000 lines to Language Technology and got back fully structured versions within a few days.

The structured programs are up to twice as long as the unstructured versions but run almost as quickly, Stamieszkin said. In addition, "Since structured code is modular and easier to understand, finding the location of the code to be changed is easier and testing is easier," she said.

Peat, Marwick, Mitchell & Co. offers a similar service for Cobol-to-Cobol and assembler-to-Cobol translation through its Chicago-based Catalyst Group.

Unlike Language Technology, the Structured Retrofit service involves some manual intervention but similarly produces structured software at a cost ranging from 50 cents to $2 per line, depending upon volume and services requested, explained Mary Kay Kluge, a senior manager at Peat Marwick.

The service reorganizes program logic, reformats code, isolates I/O, raises control logic and builds a mainline program structure with modular paragraphs. Programs are commented, and other reports are provided, Kluge said.

The Peat Marwick service saved ITT Commercial Finance Corp. of Clayton, Mo., "a ton of money," according to Melvin F. Brown, president. He said ITT Commercial Finance ran most of its source library through Structured Retrofit two years ago to obtain the documentation needed for a large-scale upgrade.

A packaged restructuring system is sold by Group Operations, Inc. of Washington, D.C. Superstructure redefines Procedure Division code into independent modules with one entry and exit point; cuts out interparagraph GOTOs and fall-throughs; identifies dead code; and eliminates PERFORM range violations, a spokesman said.

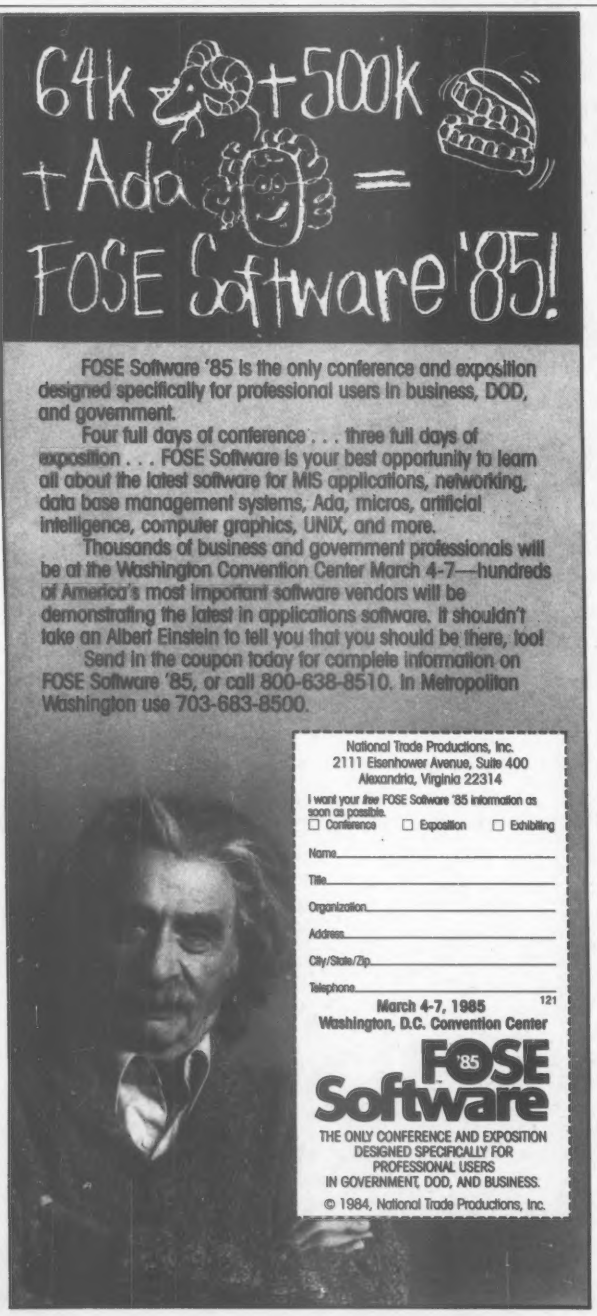
A user of the product, Dayton Hudson Department Store Co. of Minneapolis, has run between 25 and 30 programs of up to 9,000 lines of code through Superstructure and has found no functional differences between the old program and the structured result, according to Don Saul, a senior support analyst.

'A lot easier to find bugs'

"We use it mostly on programs that we're having problems with," Saul said. "We find it's a lot easier to find bugs once you've got a structured program."

He explained that a Superstructure run takes a little longer than an ordinary compile and produces about twice as much source code as the input program. However, runtimes of the new programs are comparable, he said.

Superstructure highlights dead code, adds a descriptive paragraph in the Procedure Division called "Startemup" and includes a comment box in each paragraph showing from where it was performed. Dayton Hudson has had a few problems maintaining procedure calls in the restructured programs but has been able to work around them, Saul said.



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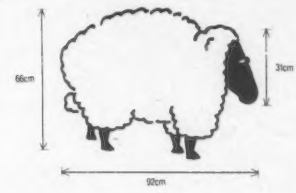

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Users laud Unix portability, call flexibility a weakness

CW AT UNIFORUM

By Paul Korzeniowski
CW Staff

DALLAS — The greatest strength of AT&T's Unix is its portability, and its greatest weakness is its flexibility. That was the consensus of a sample of AT&T Unix users last week at the 1985 Uniforum International Conference of Unix Users here.

"There are so many Unix variations available that a user often feels like [he's buying] a pig in a poke," noted Robert Egent, a pathologist at St. Luke's Episcopal Hospital in Houston. "Finding software that meets one's needs and takes full advantage of one's equipment is difficult. Unix is larger and more flexible than it has to be. Systems with less flexibility can often provide better solutions."

Harry W. Brown at Datagraphics Services, Inc. in Valley Stream, N.Y., added, "Unix provides a number of programming options to solve a problem. Determining which method is best suited to a situation can be frustrating."

AT&T has stated that Unix's portability would encourage applications software vendors to develop Unix software because the developers could easily port their software from one Unix machine to another.

Lack of software

Yet users complained about a lack of software. "There really isn't much applications software available," said Brian McNeely of the Internal Revenue Service agency located in Boonsboro, Md. "Third-party software development is now just beginning."

Datagraphics' Brown said he experienced this purported lack of support. His company recently bought a Unix system, and he cited poor documentation as the primary Unix deficiency. "To solve a problem, a user has to be a computer scientist or wade through two or three reference manuals," he maintained.

Performance issues were also cited as Unix deficiencies. "Generally, Unix response time is slow," Jim Bovers of IBM claimed.

Peter Mikkelson of NCR Corp. noted, "Unix does not function well with real-time processing."

IBM's Bowers added, "Unix does not provide adequate support for data base management systems." Another limitation he mentioned was Unix's lack of a friendly interface for the nontechnical person.

Infomart first of its kind

High-tech boom made exhibit market feasible

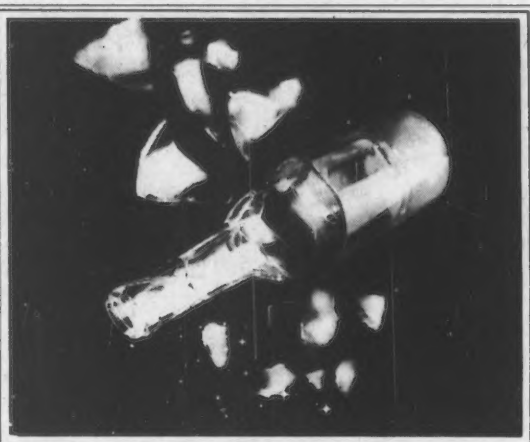
By John Gallant
CW Staff

DALLAS — Nearly 20 years ago, when Trammell S. Crow first envisioned a vast marketplace designed to bring the buyers and sellers of high-technology products together within the confines of this booming southwestern city, some people scoffed at his idea.

Critics claimed that there were only a handful of high-tech companies and only a limited number of computer users. But Crow's vision persisted, and his idea was vindicated by the metamorphosis of the computer industry. As computing technology began to pervade everyday life, the number of vendors increased rapidly and the population of users expanded exponentially. Crow's computer mall concept began to win adherents.

Today, Crow's idea graces the Dallas skyline. It is embodied in the gleaming white steel and sparkling glass of Infomart, which was officially christened last week during ceremonies marking the opening of the world's first permanent information processing market/conference facili-

See INFOMART page 12



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Small system utilities premiere at Unix conference

CW AT UNIFORUM

By Paul Korzeniowski
CW Staff

DALLAS — For small Unix systems, operating system enhancements and utilities were plentiful, but productivity packages were few in number among new product offerings at last week's 1985 Uniforum International Conference of Unix Users here.

Unisource Software Corp. introduced The Scheduler productivity package, which serves as an appointment book and interoffice bulletin board, the vendor said. It allows a user to print a daily, weekly or monthly schedule and includes password protection. The Scheduler has on-line Help, runs under Unisource's Venix, Microsoft Corp.'s Xenix and MS-DOS and IBM's PC/IX operating systems and costs $149. Unisource is located at 71 Bent St., Cambridge, Mass. 02141.

Island Graphics Corp. introduced Solar Paint, a painting program that runs on Sun Microsystems, Inc.'s workstations. The package can magnify, mirror, copy, enlage, move, invert, rotate, shrink and erase pictures, according to the vendor. Solar Paint costs $1,895. Island Graphics is located at One Harbor Drive, Sausalito, Calif. 94965.

R Systems, Inc., a Dallas software company, rolled out R Word III, a word processing, office time management and data base management system (DBMS) that runs under both Unix and Xenix.

The product's word processing features include a spelling checker, mail merge capability and three-level file structure, the vendor said. Its DBMS functions reportedly permit a user to select 10 fields and create a 99,000-record file. As an office manager, its features allow multiple card files, daily schedulers and appointment books, according to the vendor. R Word III sells for $1,295. R Systems is located at 11450 Pagemill Road, Dallas, Texas 75243.

Among the operating system software enhancements, Venturcom, Inc. released Venix System V, which is based on Release 2 of Unix System V. This Unix release provides binary compatibility between computers that run System V Release 2. Application software designed for System V Release 2 machines can be compiled under Venix with few changes, the vendor said. It costs $895. Venturcom is located at 215 First St., Cambridge, Mass. 02142.

Uniform Software Systems, Inc. enhanced The Connector so that it supports IBM's Topview operating environment. The Connector reportedly allows a user to run Unix and MS-DOS applications concurrently. But the product does not provide complete file transfer capabilities between the two operating systems, the vendor said. It costs $299. Uniform is based at Suite 514, 225 Santa Monica Blvd., Santa Monica, Calif. 90401.

Viasyn Corp., formerly Compupro Corp., announced that Uniplus System V, a Unix operating system from Unisoft Corp., is available for Compupro's System 816/E multiuser microcomputer line. The System 816/E is suited for Unix because it makes maximum use of its memory management unit, the vendor said. The operating system costs $1,495. Viasyn is located at 3506 Breakwater Court, Hayward, Calif. 94545.

INFOMART from page 11

ty. In conjunction with the public unveiling of Infomart, officials kicked off the 1985 Uniforum International Conference of Unix Users, the first of 42 major events scheduled at the facility this year alone. The opening ceremonies were capped off with the lighting of a 100-ft Uniforum sign and the switching-on of the crystal fountain in the Infomart atrium.

The building was modeled after London's Crystal Palace, which was built to host the first world's fair in Great Britain in 1851. Like its forerunner, which was designed to highlight the products and services of the burgeoning industrial revolution, Infomart is intended to showcase the wares of the computer revolution.

Infomart's backers say the permanent quasi-trade show gives consumers the opportunity to educate themselves on new products and technologies and gives vendors a chance to shorten the evaluation process and cut marketing costs.

The building itself occupies about six full acres on a 25-acre site. It was developed by the Trammell Crow Co. at a cost of about $97 million.

Infomart offers more than 300,000 square feet of temporary exhibit space and almost 900,000 square feet — the area of 20 football fields — of permanent vendor showrooms.

Companies, including AT&T, Texas Instruments, Inc. and Xerox Corp., that have already moved into the facility have laid out elaborately furnished product information/customer training facilities on the floors above ground level.

Infomart officials expect to draw some 350,000 visitors in 1985 with trade shows, seminars and symposia targeted at specific audiences.

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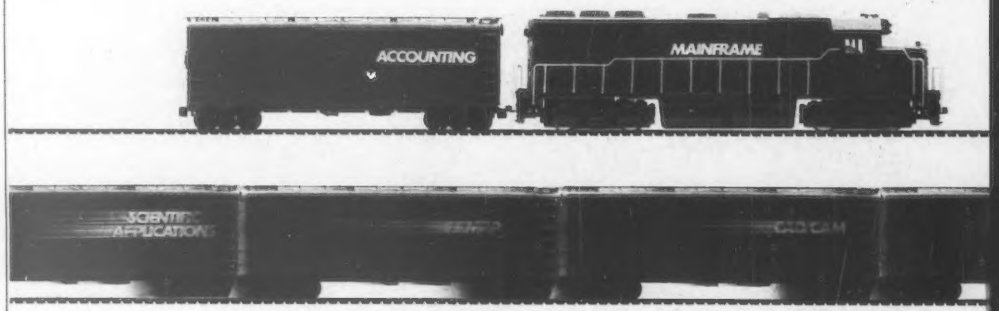

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DG, DEC, Amdahl boost large systems Unix offerings

CW AT UNIFORUM

By John Gallant
CW Staff

DALLAS — Enhancements to Data General Corp. and Digital Equipment Corp. Unix products and the introduction of two Amdahl Corp. Unix packages were among the large systems software debuts made at last week's 1985 Uniforum International Conference of Unix Users.

DG announced that its DG/UX native Unix operating system now supports the Pascal and Ryan-McFarland Corp. RM/Cobol programming languages. A spokesman said DG/UX Pascal is a high-level structured programming language with a common code generator. It also shares the same optimizer as the company's DG/UX C and Fortran 77 products.

DG/UX Pascal is said to conform to Ansi-standard Pascal and provide error-checking capabilities and runtime diagnostics. It is supported by the University of California at Berkeley DBX source language debugger and is priced at $4,910.

RM/Cobol is a version of the Ansi Cobol 74 standard. It features full Level 2 relative and indexed file access methods and multikeyed indexed files with 14 alternate keys and duplicates. Variable names in SELECT and CALL statements are said to allow files and called programs to be specified at execution time. The product licenses for $1,500.

DG is located at 4400 Computer Drive, Westboro, Mass. 01580.

DEC enhancements

DEC unveiled a series of enhancements for two of its Unix-based operating systems — Ultrix-32 and Pro/Venix. A spokesman said Version 1.1 of Ultrix-32 provides greater support for VAX series processors and better compatibility with AT&T's System V Unix. Ultrix-32 is an interactive, virtual-memory, time-sharing Unix system that runs on the VAX line.

Version 1.1 of Ultrix-32 now features the Source Code Control System from AT&T's Unix System III to improve software development productivity. Other System V commands and utilities have also been added to the DEC product to improve compatibility between Ultrix-32, DEC's Ultrix-11 and AT&T's Unix offerings, the spokesman said. Diagnostic testing within Ultrix-32 reportedly has also been enhanced to enable a user to read directly from a distribution tape, locate diagnostic problems and load and execute corrections from an Ultrix-32 file system.

According to the spokesman, the minimum configuration of Ultrix-32, Version 1.1, is a packaged system consisting of a VAX-11/725 with 2M-byte main memory, a one- to 16-user Ultrix-32 license, dual TU58 tape systems, a 52M-byte disk system and a multifunction communications device for $31,950.

Like Ultrix-32, Pro/Venix is a derivative of AT&T's Version 7 Unix and includes Berkeley enhancements. It runs on DEC's Professional 350 and 380 systems.

Version 2.0 of Pro/Venix allows applications designed to run under System V to be ported to Pro/Venix with minor or no modifications, the spokesman said. The product has been enhanced with System V features and a graphics library. It supports the Professional Real-Time Interface and the Professional Ethernet Controller hardware options.

Other enhancements to Pro/Venix reportedly include support for a laboratory interface module on a Professional workstation. The base Pro/Venix, Version 2.0, is priced at $495 from DEC in Maynard, Mass. 01754.

Amdahl software

Also in the way of large systems Unix software, Amdahl announced two Unix-based software packages. One product, (Universal Time-Sharing System/System V (UTS/V), is an implementation of AT&T's Unix System V, Release 2, for use under IBM's VM/SP on Amdahl 580 mainframes and other IBM 370-architecture machines; the other product, UTS/F was described as a companion product to UTS/V for full-duplex Ascii communications support.

An Amdahl spokesman said that because UTS/V operates under VM/SP, it can share the processing resources of the mainframe with other system control programs. In addition to supporting the features of System V, Release 2, the product supports the IBM 3270 family of terminals, systems administration and operations enhancements for the large system environment and tools for communications with Unix and IBM's MVS and VM operating systems.

UTS/F runs on the Amdahl 4705 series communications processors and provides full-duplex Ascii communications support compatible with other Unix systems. UTS/F allows UTS/V to process data from Ascii-compatible terminals one character at a time rather than as large blocks of data.

License fees for UTS/V range from $10,000 to $25,000 per year. The license fee for UTS/F is $2,500 per year. Amdahl can be reached through P.O. Box 470, 1250 E. Arques Ave., Sunnyvale, Calif. 94086.

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Addressing end-user needs lies in future for Unix

CW AT UNIFORUM

By John Gallant
CW Staff

DALLAS — What role will AT&T's Unix play in the future? The role of a pawn with which IBM will keep AT&T off-balance? A tool for survival for the non-IBM-compatible mainframe vendors? An operating system in search of standardization, one relegated to dwelling in limited market niches?

Those were some of the possibilities about Unix's future posited by a panel of Unix industry watchers during a session at last week's 1985 Uniforum International Conference of Unix Users.

Overall, panelists predicted a bright future for Unix, provided vendors could overcome incompatibility problems between Unix versions — and decide on some industry-wide standards — and begin meeting the real needs of the end-user community.

"Unix is not a cure for cancer," quipped Jean Yates, president of Yates Ventures, Inc., a Palo Alto, Calif.-based market research firm. "I think the Unix marketplace has begun to suffer some consolidation problems. The entrepreneurial phase appears to be over, but some solid opportunities lie ahead."

Current offerings 'dismal'

Yates said that Unix is rapidly establishing itself as a standard operating system for data acquisition tasks and for the scientific and engineering communities. But for end users, she claimed, the current offerings of useful applications software are "still pretty dismal."

Fellow panelist Esther Dyson, president of Edventure Holdings, Inc., a New York-based market research firm agreed with Yates' assessment of the state of Unix applications.

> *'This is the year for the companies that will eventually survive to start serving the end user.'*
>
> — Jean Yates, Yates Ventures, Inc.

"In the Unix marketplace, the value added will be in applications. The market has to move toward the end user who does not care what the operating system is," she said.

"For example," Dyson continued, "people talk about a version of [Lotus Development Corp.'s] 1-2-3 for Unix. Users do not care if 1-2-3 runs on Unix as long as it runs.

"For Unix applications to be successful, they cannot be just copies of other products. They must be vertical market applications that take advantage of Unix's strengths and not cheap imitations of popular packages running under an inappropriate operating system."

Reinforcing Dyson's remarks, Yates said Unix hardware and software vendors must begin to address those end-user requirements. "These companies have got to start talking to end users," she said. "We've been selling to each other for years. This is the year for the companies that will eventually survive to start serving the end user. There is not very much of that going on now," Yates said.

Aaron Goldberg, an analyst at International Data Corp., a Framingham, Mass.-based market research firm, said 1985 will see the end-user market for Unix begin to grow — albeit slowly.

Goldberg also said that IBM will continue to add to the confusion that surrounds the different Unix versions.

"It is not in IBM's best interest to clarify the market for Unix," he said. "IBM will wait for the big market pieces to form and then it will jump in and take its share."

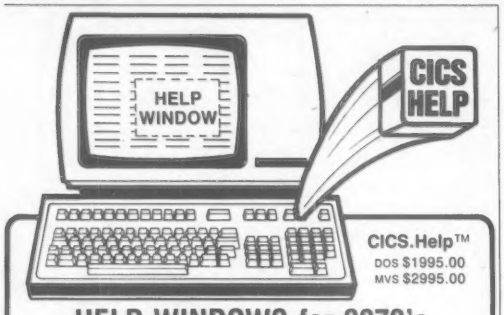
Product with a future

Despite that, Goldberg said, AT&T's System V Unix will meet with success. "I predict that System V will do quite well. Users want to build on a product with a future. AT&T is devoting tremendous resources to System V to see it succeed."

Also, he said the Bunch companies (Burroughs Corp., Sperry Corp., NCR Corp., Control Data Corp., Honeywell, Inc.) may be looking at Unix as a survival strategy for the future. Goldberg said Sperry and NCR have already begun to shift their software strategies toward Unix, and others may soon follow.

"Unix has a real place in the market. There are a lot of resources behind it. I think the Bunch is seeing it as a survival strategy. Maybe in 1995 there will only be [IBM's] MVS and Unix players," he said.

Yates echoed Goldberg's sentiments. "The Bunch companies cannot afford the multimillion dollar investment in proprietary operating systems and other software."



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Apple presents Macintosh Office, drops Lisa line

By Kathleen Sullivan
CW West Coast Bureau

CUPERTINO, Calif. — Apple Computer, Inc. last week answered critics who have questioned the viability of the Macintosh in the corporate world by introducing the Macintosh Office, which includes a laser printer, a network and a file server.

In addition, the firm announced it will rechristen and reposition the Lisa 2/10 as the Macintosh XL and drop the rest of the Lisa line. Also, the price of the Macintosh 512K was cut to $2,795.

Apple used its annual meeting, held here last week, to showcase its new product line, announcing the Laserwriter, Appletalk Personal Network, a file server (currently unnamed) and the renamed Macintosh XL.

Apple's Laserwriter is built around a Canon U.S.A., Inc. engine, which features a resolution of 300 dot/in. Inside the Laserwriter is a built-in computer — a Motorola Corp. 68000 microprocessor running at 12 MHz with 1.5M bytes of random-access memory (RAM) and 0.5M bytes of read-only memory (ROM).

The Laserwriter's printing speed depends on the complexity of the document being printed, the company said. It is said to print text documents at 8 page/min; the throughput of documents that include text and graphics is estimated to be 2-3 page/min.

Font families

Four font families — Times Roman, Helvetica, Courier and Symbol — are stored in ROM. Additional fonts can be downloaded. According to Apple, the Laserwriter can produce font sizes as small as four points, while large point sizes are limited only by the size of a page. The printer is also said to feature Postscript, a page description language developed by Palo Alto, Calif.-based Adobe Systems that was designed specifically for high-resolution printers and typesetting machines.

Apple said the Laserwriter features a built-in interface to its Appletalk network. In addition, the printer is said to include an RS-232 port and a program that emulates a Diablo Systems, Inc. 630 printer. According to Apple, these features will allow users to connect other computers — such as the IBM Personal Computer and its compatibles — to the Laserwriter and print documents without software modification.

The Laserwriter will be available on March 15 at a price of $6,995, the company said.

The Appletalk Personal Network, a baseband network with a bus topology, allows users to connect up to 32 computers at a distance of up to 1,000 feet, the company said. Apple said the network will transmit data at 230.4K bit/sec.

At present, Appletalk only allows users to share the Laserwriter. No file transfer capability is available, so it is not yet a full-function network. Apple officials said they expect third-party developers to fill in this gap by spring.

The Appletalk connector kit includes two meters of twisted-pair cabling, a connector module and an extender for $50 and will be available March 15. No special boards are required to connect Macintosh computers to the Appletalk network, because the circuits are already built into the machines, the company said.

Apple also announced plans to develop an Appletalk card for the IBM Personal Computer that will allow Macintoshes and IBM Personal Computers to share and exchange data over the Appletalk network. An Apple spokesman said the card will be available this fall; no price was available for it.

The company also announced that two Appletalk file servers — a 20M-byte and a 40M-byte server — will be available this fall. Apple has not yet announced prices for the servers. An Apple spokeswoman said the servers will provide software to handle print spooling, file transfer and electronic mail. Appletalk will not offer these until the servers become available.

According to Apple, more than 50 companies are developing products for the Appletalk network. Among the firms are 3Com Corp., a Mountain View, Calif., firm that plans to introduce an Ethernet interface for Appletalk; Sunol Systems, Inc., in Pleasanton, Calif., which has said it will introduce a hard disk drive for Appletalk; and Lutzky-Baird Associates in Los Angeles, which announced an Appletalk/AT&T Unix-based file server and electronic mail software.

The company announced that it was renaming the Lisa 2/10, dubbing it the Macintosh XL and pricing it at $3,995. When introduced a year ago, the 2/10 cost $5,495. Apple said it planned to phase out the Lisa operating system and the Lisa line of workstations, including the Lisa 2, 2/5 and 2/10.

The Macintosh XL features a 12-in. screen (the original Macintosh has a 9-in. screen), a 10M-byte hard disk, a 3.5-in. floppy disk and 512K bytes of RAM that can be expanded up to a full megabyte.

The company said it will encourage Lisa users to switch over to the Macintosh operating system by offering the utilities necessary to convert files generated by the Lisa's integrat-

See APPLE page 16

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Apple eyes corporate market with Macintosh Office

By Kathleen Sullivan
CW West Coast Bureau

CUPERTINO, Calif. — In the eyes of industry watchers, last week's introduction of the Macintosh Office will help Apple Computer, Inc. establish a beachhead in a corporate marketplace clearly dominated by IBM. But there are still hurdles to be cleared before the company can go one-on-one with Big Blue in the Fortune 1,000 market.

The announcement of the Macintosh Office — now consisting of Macintoshes that range from a low-end system to a Macintosh with 1M byte of internal memory and a 10M-byte hard disk, the Laserwriter printer and Appletalk Personal Network (see story page 15) — points Apple in the right direction, the analysts agreed, but it is only one component of a strategy for success.

The Macintosh Office "fills the gaps" in the company's product line," said Mary Ellen Dick, senior analyst with Software Access International, Inc., a California-based market research firm. Esther Dyson, president of Edventure Holdings, Inc., a New York-based market research firm, agreed that Apple's new products would help boost the company's credibility as a corporate office supplier. At the same time, she said, several issues remain to be resolved, including interconnects to the IBM world and the paucity of Macintosh software, when compared to the numerous software titles available for the IBM Personal Computer.

Dyson also challenged the viability of Apple's corporate presence if it tries to enter the market by selling a net that does not support IBM Personal Computers and runs slower than Ethernet.

Joan McKay, an analyst with New York-based Kidder, Peabody & Co., agreed, saying that she was concerned that Apple would not be able to provide IBM communications capability until summer. "I'm still skeptical about the Macintosh," she said. "I still think it's going to be a tough sale into the corporate environment."

Aaron Goldberg, an analyst with Framingham, Mass.-based International Data Corp., had a more positive interpretation of Apple's announcements. Goldberg said the Macintosh Office — along with the IBM communications capabilities that will be provided by Apple and third-party vendors — will "put Apple back into contention for office desktops." Goldberg said the announcement also signals an important change in Apple's corporate philosophy toward what Apple's President John Sculley has referred to as "competitive coexistence" with IBM. Sculley's pragmatic attitude will help put Apple in a much better position in the future, he said.

Kenneth Lim, an analyst with Dataquest, Inc., a San Jose, Calif., market research firm, said Apple now "has a product line that no other company can match." But products alone do not give companies an entry into the Fortune 1,000 market, he noted. Apple lacks the sales force it needs to sell into those companies, he said. In addition, Apple must overcome the skepticism of MIS directors "who don't have any faith or belief in Apple."

Andy Seybold, contributing editor of "The Seybold Report on Professional Computing," agreed that Apple will need more than the Macintosh Office to make an effective sales pitch in the corporate world. The key to success, he said, is an alliance with a company such as Wang Laboratories, Inc.

APPLE from page 15

ed software package — known as 7/7 — to Macintosh files. Apple said it will offer current 7/7 users a package that will include Lotus Development Corp.'s Jazz; Apple's Macdraw, Macproject and Macworks XL; and the conversion utility during the second quarter of 1985. The Macworks XL is expected to be available in late February. With the utility programs, users will be able to convert Lisawrite files to Macwrite, Lisadraw files to Macdraw and Lisaproject files to Macproject, the company said.

Apple said it will also provide a utility to convert Lisacalc files to Lotus' Jazz integrated software package.

The only hardware change necessary to turn a Lisa 2/10 into a Macintosh XL involves an internal adjustment that alters the Lisa's pixel count to bring it in line with that of the Macintosh, an Apple spokesman said.

Further information is available from Apple Computer, which is located at 20525 Mariani Ave., Cupertino, Calif. 95014.

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Court finds former SSA DP director guilty of bribery

BALTIMORE — Kenneth M. Barry, a former high-level DP official at the Social Security Administration (SSA), was convicted of bribery by a federal court jury here after prosecutors said he solicited and received payments from a California software company that hoped to get an SSA contract.

Barry promised the Los Angeles-based firm, Engineering & Contract Labor International (E&CLI), that he would steer a $4 million subcontract to them in return for payments in excess of $400,000, according to an affidavit by Federal Bureau of Investigation agent Jonathan R. Hersley [CW, March 5].

Barry, 55, was convicted of two bribery charges after a four-day jury trial in U.S. District Court here. Federal law prohibits U.S. government officials from seeking or accepting payments to influence their public duties.

Sentencing by Judge Walter E. Black Jr. is likely to occur next month, according to Assistant U.S. Attorney Michael Schatzow. Barry faces a maximum sentence of 30 years in prison and $1.1 million in fines for the bribery charges, Schatzow said.

At the time of the offenses, Barry was director of the SSA's Office of Data Communications; later he was director of the Office of Systems Engineering and director of the Software Technology Center at SSA's computer center in Woodlawn, Md., according to court documents, which said Barry resigned from his position last April.

Barry denied the charges in court filings. He said he accepted $7,500 from E&CLI as a loan to be repaid later and asserted that he "performed his duties at SSA exercising his best judgment and without regard to the promise, expectation or payment of monies" from E&CLI.

The case involved a controversial $100 million contract the SSA awarded to Paradyne Corp., a Largo, Fla.-based hardware vendor, for a national network of 1,850 computer terminals, called the SSA Data Acquisition and Response System.

In the summer of 1980, according to the FBI agent's affidavit, Barry met in Los Angeles with Robert P. Madariaga and Bill Serrin and informed them he could influence Paradyne to give them the software subcontract, called the SSA Local Intelligence project. Madariaga and Serrin then formed E&CLI and began recruiting programmers from England in anticipation of the contract and agreed to make payments to Barry, court documents said.

Barry also supplied Madariaga and Serrin with confidential documents about SSA application software that helped the E&CLI officials "tailor their proposal to SSA in such a manner that it would be readily acceptable," according to the FBI affidavit.

Last March, Barry was arrested by FBI agents at his Reisterstown, Md., home and indicted on 23 counts of bribery and extortion — later reduced to three counts — in federal court in Los Angeles.

The jury convicted Barry on two counts of bribery: One charge said that from September 1981 to August 1982 Barry sought between $363,000 and $426,000 in payment from E&CLI, with the payments to be funneled through Chesapeake Bay Systems, Inc., a firm partly owned by Barry.

The other charge said that in July 1981 Barry sought and actually received $7,500 — a payment that Madariaga said Barry demanded in cash because he was "financially strapped," the FBI affidavit said.

Barry was acquitted of a third charge that he sought a $4,000 payment in June 1982.

Citing heavy debts and travel expenses, Barry persuaded the California court to move the case to Maryland, and he was assigned a public defender. The former SSA official earned about $58,000 a year at the agency, according to a court document.

Barry's case had been scheduled to go to trial last September, but the defendant failed to appear and forfeited his $50,000 bond. He was arrested again in November in San Antonio and returned to Maryland for the trial this month. Barry faces up to five years in prison and $5,000 in fines for failing to appear for the September trial date.

Megatech show reset for 1986

DALLAS — The Megatech computer industry trade show, previously scheduled for this March, has been rescheduled for March 24-27, 1986, at Infomart here.

The computer industry event, cosponsored by Professional Exposition Management Co. (Pemco) of Des Plaines, Ill., and Infomart, has been rescheduled in order to avoid conflicts with other major industry events, said John Dobbertin Jr., president of Pemco.

More information is available from Pemco, Suite 205, 2400 E. Devon Ave., Des Plaines, Ill. 60018.

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Programmers top execs' hiring list for first part of '85

PARK RIDGE, Ill. — Corporate information executives will be stalking the rare programmer and systems analyst with renewed vigor in the first quarter of 1985.

Sixty-one percent of the 254 corporate information executives who responded to a recent survey plan to increase their staff during the first three months of 1985. Programming positions will account for 48% of all DP/MIS job openings in that time frame, according to a "Comp-U-Fax Computer Trends" newsletter survey of the Data Processing Management Association (DPMA) International's members.

Systems analysis positions will represent 35% of the openings, followed by data base (7%), telecommunications (4%) and data entry/operation positions (4%), the survey revealed.

The executives polled said programmers and systems analysts are the hardest DP/MIS jobs to fill. Most DPMA International members who responded attributed this problem to high turnover rates and an inherent lack of specific applications experience.

Other hard-to-fill positions include telecommunications and data base specialists, the survey said. According to the executives polled, DP/MIS professionals trained in fourth-generation languages are also in short supply.

Surplus of entry-level positions

The members polled said they see a surplus of job applications for entry-level programming and data entry/operation positions.

Large companies account for most of the projected hirings, the survey showed. Sixty-eight percent of the respondents who said they work in large corporations plan to increase their staffs; 34% of those claiming to be from medium-size companies are budgeting for new members and only 19% of the respondents who said they are from small companies plan to expand their staffs.

Comp-U-Fax conducted the survey among 1,000 DP/MIS managers in primarily Fortune 1,000 manufacturing, finance and banking companies and in state and federal government agencies, a DPMA spokesman said.

DPMA, publisher of the bimonthly newsletter, plans to conduct additional DP/MIS hiring trend surveys throughout 1985.

Copies of the survey newsletter are available at no charge. Subscriptions to the newsletter are $18/year.

More information is available from DPMA, 505 Busse Highway, Park Ridge, Ill. 60068.

Warnier Prize Foundation seeks nominees

TOPEKA, Kan. — The Warnier Prize Foundation selection committee is accepting nominations until May 1 for the third annual J.D. Warnier Prize for excellence in information science.

The prize — a $3,000 honorarium and a commemorative medal — was established in 1983. It is awarded to a person who has made an outstanding contribution to the theory and practice of information science.

Barry W. Boehm, chief engineer of the software information systems division of TRW Corp.'s Defense Systems Group in Redondo Beach, Calif., won the 1984 prize for his efforts in finding solutions to the problems of software development. Enid Mumford, professor of organizational behavior at the Manchester (England) Business School won the 1983 prize for her research on the design and human consequences of computers.

The 1985 award will be presented at Feedback '85, the 10th annual Data Structures Systems Development users conference, sponsored by Ken Orr & Associates here Oct. 8-10.

Information concerning qualified candidates should be sent to Gerald Weinberg, Chairman, the J.D. Warnier Prize Foundation selection committee, 1725 Gage Blvd., Topeka, Kan. 66604.

Info/Central meeting set

CHICAGO — Info/Central: The Information Management Exposition and Conference will be held at the O'Hare Exposition Center at O'Hare International Airport here Feb. 20-22.

The conference, sponsored by Info/Central, will reportedly focus on telecommunications planning and data security systems.

Conference registration rates are $85 for half-day attendance, $150 for full-day attendance and $295 for the entire three days of the conference.

More information is available from Info/Central, 999 Summer St., Stamford, Conn. 06905.

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University's bibliography lists computer-related books

By J. Daniel Couger
Special to CW‡

Although relatively new, the artificial intelligence /expert systems field generated some excellent books in 1984. Yet this category accounts for only five of the more than 300 new books in the 18th edition of the "Annual Bibliography of Computer-Oriented Books," released this month by the University of Colorado.

Equally important is the improvement in books on advanced programming (14 new books) and data processing management (11 new books). Hornstein's *Logic as Grammar: Natural Language* is an example of the new high-quality programming books. Cortada's *Strategic Data Processing* and Parikh's *Programmer Productivity* are two examples of the improved books on management of DP. A third is *Handbook of Software Engineering* by Vick and Ramamoorthy.

In the system design area, 18 books were published, including Boar's *Application Prototyping*. The sections on micros and personal computers erupted with 82 titles in the last two years.

The two best additions to the AI/expert systems category are *Rule-Based Expert Systems* by Buchanan and Shortliffe and *AI: Tools, Techniques and Applications* by O'Shea and Eisenstadt. Three of the books in that field are by Winston, including his newest — well written but without a lot of imagination in its title *Artificial Intelligence*.

Advanced programming

The section on advanced programming has grown to 94 entries. Although all the books are serious in tone, some of the titles and styles of presentation are lighthearted, such as Baker's *Scuttle the Computer Pirates*. The subject of personal computer programming was the most popular topic among books published this past year. Thirty-six of those books centered on IBM Personal Computers, with some advanced books now appearing, such as Schwaderer's *Digital Communications Programming on the IBM PC*.

In the programming language section, Basic, the subject of 19 books, continues to dominate. Pascal is making inroads, however, with 11 titles. But those are only the generic books. When we include the books peculiar to specific machines, the list almost doubles. A resurgence in interest in Lisp results from its use in AI. Three books dealing with Lisp were published in the past year. A good one is Touretzky's *Lisp: A Gentle Introduction to Symbolic Computation*. Another AI-related language book is *Micro-Prolog* by Clark and McCabe. Six books were published on Ada and three on the C language. The section of Forth now contains eight books.

The system design category now contains more than 100 books. The new books run the gamut in degree of complexity. For example, the additions to the communications section range in complexity from Stallings' *Local Networks: An Introduction* to Weis' *Elements of Digital Satellite Communication* and Gowar's *Optical Communication Systems*. The additions to the data base design section range in complexity from Townsend's *Using Dbase II* to Merrett's *Relational Information Systems*.

The spreadsheet books outdistanced all applications areas with 15 additions. These were the generic books, however; when machine-specific books are included, the spreadsheet section contains more than 25 entries. After the first surge of hastily written books on the subject, some good ones have emerged, such as Ewing and LeBlond's 701-page *Using Symphony*. Baras' *Guide to Using Lotus 1-2-3* and Tymes and Antoniak's *Multiplan* are examples of other new entries on popular integrated packages.

In all, 41 books were published in the applications area. Other books dealing with applications included Brook's *Investing with a Computer*, Perry's *Improving Audit Productivity* and the 745-page tome, *Manufacturing Planning and Control Systems* by Vollman and others.

In addition to the Cortada and Parikh books mentioned previously, the section on DP management was strengthened with the addition of *Quantitative System Performance* by Lazowska and others and Fisher's *Information Systems Security*. With the addition of 11 books, the management section now contains 94 titles. The project management category is the strongest in the section, although no new titles were added this year.

Need for improvement

There are obvious and disappointing omissions in some subject areas. The personnel area within DP had no additions, despite the fact that personnel costs account for almost half of the typical department budget. The marketing applications section has not had a new entry since 1981. The government section has one new

See **BOOKS** page 22

Couger is a professor of computer and mangement science at the University of Colorado.

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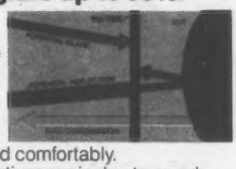

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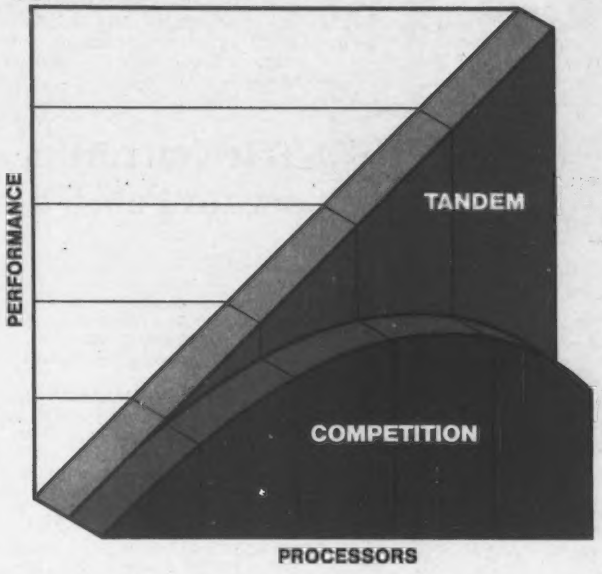

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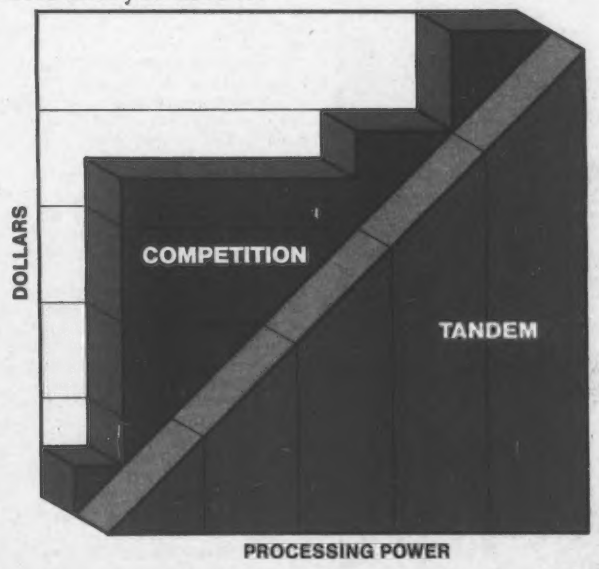

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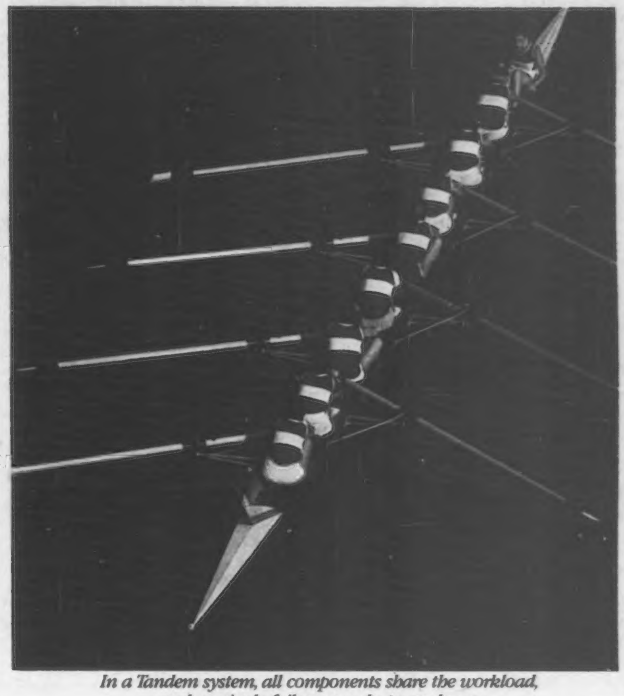

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TANDEMCOMPUTERS

Cbema workshops to help trainers teach managers correct VDT use

WASHINGTON, D.C. — Corporate trainers will be given the expertise and training materials to educate managers and supervisors in the proper use of VDTs at three workshops. These workshops were scheduled by the Computer and Business Equipment Manufacturers Association (Cbema).

The workshops will be held at Cbema headquarters here Feb. 26-27, April 9-10 and May 7-8.

After the workshop, trainers will be able to conduct management workshops in their organizations. These workshops will use slides, a videotape, an instructor's manual and backup materials, Cbema officials said.

Low-cost solutions to health problems

Charlotte LeGates, Cbema's director of communications, said the workshops were initiated to acquaint management with low-cost solutions to the health problems associated with VDT use, such as eye- and back strain.

The workshop fee is $290.

More information is available from Cheryl Bush, VDT Trainer Workshop Information, Cbema, Suite 500, 311 First St. N.W., Washington, D.C. 20001.

Industrial automation meeting slated for March in Hong Kong

HONG KONG — The International Conference in Industrial Automation Technology will be held here March 7-8. The theme of the conference is "Micros in Affordable Automation — Creating New Industrial Opportunities for All," according to its sponsor, the Hong Kong Productivity Centre.

The conference will reportedly bring together experts in automation from the U.S., the UK, West Germany, Italy, Sweden, Japan, Singapore and Hong Kong.

Roughly 200 automation experts are expected to attend the conference.

Running concurrently with the conference will be an international exhibition on automation technology that will reportedly feature a range of hardware and software, including computer-aided design and computer-aided manufacturing systems, automatic integrated circuit bonding machines, manipulators, robots for manufacturing and other products.

Registration for the conference is $200 per person before Jan. 31 and $250 per person thereafter.

The Hong Kong Productivity Centre is located on the 12th Floor, World Commerce Centre, Harbour City, 11 Canton Road, Tsimshatsui, Kowloon, Hong Kong.

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Telecom forum set for Feb. 6-8

CLIFTON, N.J. — A three-day seminar on strategic planning for telecommunications services will be held Feb. 6-8 at the Baltimore Hilton Inn in Baltimore and Feb. 20-22 at the Hyatt Anaheim in Anaheim, Calif.

The conference is designed to provide planners and managers with information on planning, selecting, managing and identifying performance control of telecommunications services. The program instructor will be Raymond Wenig, president of International Management Services consulting and training firm. Registration for the course is $745. More information is available from Data-Tech Institute, P.O. Box 2429, Lakeview Plaza, Clifton, N.J. 07015.

BOOKS from page 19

entry since 1980. While there is a proliferation of books in some areas, such as personal computers, there is a shortage of good books in other areas.

The makeup of the bibliography changed this year.

All introductory-type books published prior to 1982 were deleted from the bibliography. Despite the deletions, the bibliography still contains more than 1,200 books from 155 publishers. The bibliography separates the books into 86 categories and catalogs them according to type (reference, textbook, handbook) and style of presentation (programmed instruction, case study or narrative).

Because of space limitations, some of the older programming books were eliminated. However, the bibliography retains classics like Weinberg's *Psychology of Computer Programming* (1971) and Meyer's *Art of Software Testing* (1979).

Copies of the bibliography are available for $4 from Computing Newsletter, Box 7345, Colorado Springs, Colo. 80933. The cost is $6 if an invoice is required.

The 1983 edition of the bibliography contains an additional 455 books — deleted to make room for the new entries. Both bibliographies may be purchased for $7 ($9 if an invoice is required).

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CUtil by Essential	MSDOS	139
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GraphiC - 4200 x 3100, source	MSDOS	195
Greenleaf C - thorough	MSDOS	165
HALO Graphics - fast, full	PCDOS	175
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Aussies banking on rise of data processing wages

By Lauraine Garnett
Special to CW‡

MELBOURNE, Australia — The entry of foreign banks into Australia next year will strip Australian banks of DP staff, forcing up salaries, according to a DP salary survey by Hay and Associates here.

"The days when DP personnel enjoyed lucrative benefits because they possessed skills [that were] in short supply are about to return," the survey stated.

Four or five years ago, DP salaries were 15% above those of the general market, the survey indicated, but today, salaries are only 3.5% above it.

"If it were not for the influx of the banks next year, salaries would drop even further. Instead, we think they will start to increase because most participants are boosting expenditures this year. By next year, [DP salaries] should reach 5% [above those of the general market]," the Hay and Associates survey concluded.

The survey predicted that salary increases in the general market next year will be 6% to 7%, while DP salaries will rise 10%. "The slump this year was the last of the recession," the survey said. "All development work had been curtailed and staff turnover was down dramatically from 25% in 1983 to only 18% in 1984."

Hay and Associates reviewed more than 30 of Australia's large DP installations, including one major service bureau and hardware vendor, for its second annual survey. It revealed that, contrary to popular opinion, hardware vendors did not give DP employees significantly higher paychecks, rather, they augmented salaries with other benefits.

Most companies who responded to the survey had turnovers ranging from approximately $60 million to $800 million and DP operating budgets ranging from $1.6 million to more than $12.2 million. Only two companies had a DP staff of fewer than 10, while most had from 11 to 90 staff members. Approximately one-third had more than 90 DP employees.

The survey noted that only 10% of organizations paid bonuses to DP managers for keeping within budget or for meeting requirements.

By contrast, more than 25% of companies from the general marketplace used bonuses to encourage their managers, and in the U.S., that figure was 50%.

Finally, senior DP managers here were found to be generally underpaid compared with their counterparts in the industry overseas.

Austrian law bans illicit trade

VIENNA — Legislation to prevent illegal shipments of U.S. high technology into Soviet bloc countries has been passed here by the Austrian Parliament.

Foreign Minister Leopold Gratz said the purpose of the amendment was to assure the Austrian industry unfettered access to American technology and also to prove to the Reagan administration that Austria is "prepared to create a legal basis that enables us to prosecute abusers."

The measure met with mixed reviews in Washington, D.C., where senior officials are waiting to see if Austria created the legislation as window dressing to appease the Reagan administration, or whether Austria will, in fact, strictly enforce its new law. The law calls for jail terms of up to two years along with stiff fines for violators of export licenses for the import of goods to Austria.

The issue is a sensitive one for both the U.S. and Austria, the latter positioned next to Soviet bloc countries and not wishing to upset its neighbors by heralding, such sanctions.

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NEWS

INTERNATIONAL REPORT
CW International News Network

AUSTRALIA

CROWS NEST — Another version of Cincom Systems, Inc.'s Mantis 4GL, designed to run on Digital Equipment Corp. VAX systems, has been developed here by Cincom's Australian subsidiary. VAX/Mantis will go on sale in the Asia/Pacific region during the second quarter, to be followed shortly by worldwide release.

■

MELBOURNE — Telecom Australia has signed the first agreement for use of its Iterra Satellite Service with Bamboo Management Pty. Ltd. Under terms of the agreement, an earth station is being erected at the Bamboo Creek gold mine in Western Australia. The six-channel earth station will provide telephone, data and text facilities.

■

MELBOURNE — Optimum Software has signed an agreement to distribute Software Technologies and Research, Inc.'s (Star) software products in Australia, New Zealand, Hong Kong and Singapore.

Star's software includes a dynamic allocation/de-allocation subsystem that runs under CICS and Vsam, and a modeling, monitoring and tuning package for Vsam files.

CANADA

WILLOWDALE — The Canadian Business Equipment Manufacturers Association has called for a firm government commitment for economic incentives and other policies conducive to technical innovation. The association warned that without such legislation, Canada will become a has-been in the international trading marketplace. The statement was made in response to a recent economic speech by Finance Minister Michael Wilson.

FINLAND

HELSINKI — Finland has announced plans to be the first Nordic country to erect its own silicon-wafer plant. The $11 million facility is scheduled to be completed in two years and is expected to produce 100,000 wafers per year. The state-owned Outokumpu Oy and Nokia Data will construct and run the plant.

JAPAN

TOKYO — Mitsubishi Electronic Corp. has unveiled a computer-aided engineering system intended for use by designers of buildings, roads, water and sewer pipe construction. The system, called Meicad-CE, will come equipped with a 16-bit CPU, 20M-bit hard disk storage and a printer, all for $27,600, the vendor said.

■

TOKYO — NE Corp. and NEC Home Electronics, Ltd. have jointly announced two microcomputers called PC-8001MK and PC-8801MK. The machines, compatible with the former version of the product line, include improved speed on display and access to the character and pattern telephone access information network videotex system. Prices for the two micros start at $432 and $673, respectively.

SWEDEN

STOCKHOLM — The National Swedish Telecommunications Administration (NSTA) recently proposed to the Swedish government a three-year plan recommending that the government permit manufacture of modems up to 1,200 bit/sec duplex, relinquish its monopoly on telephones and lower videotex prices.

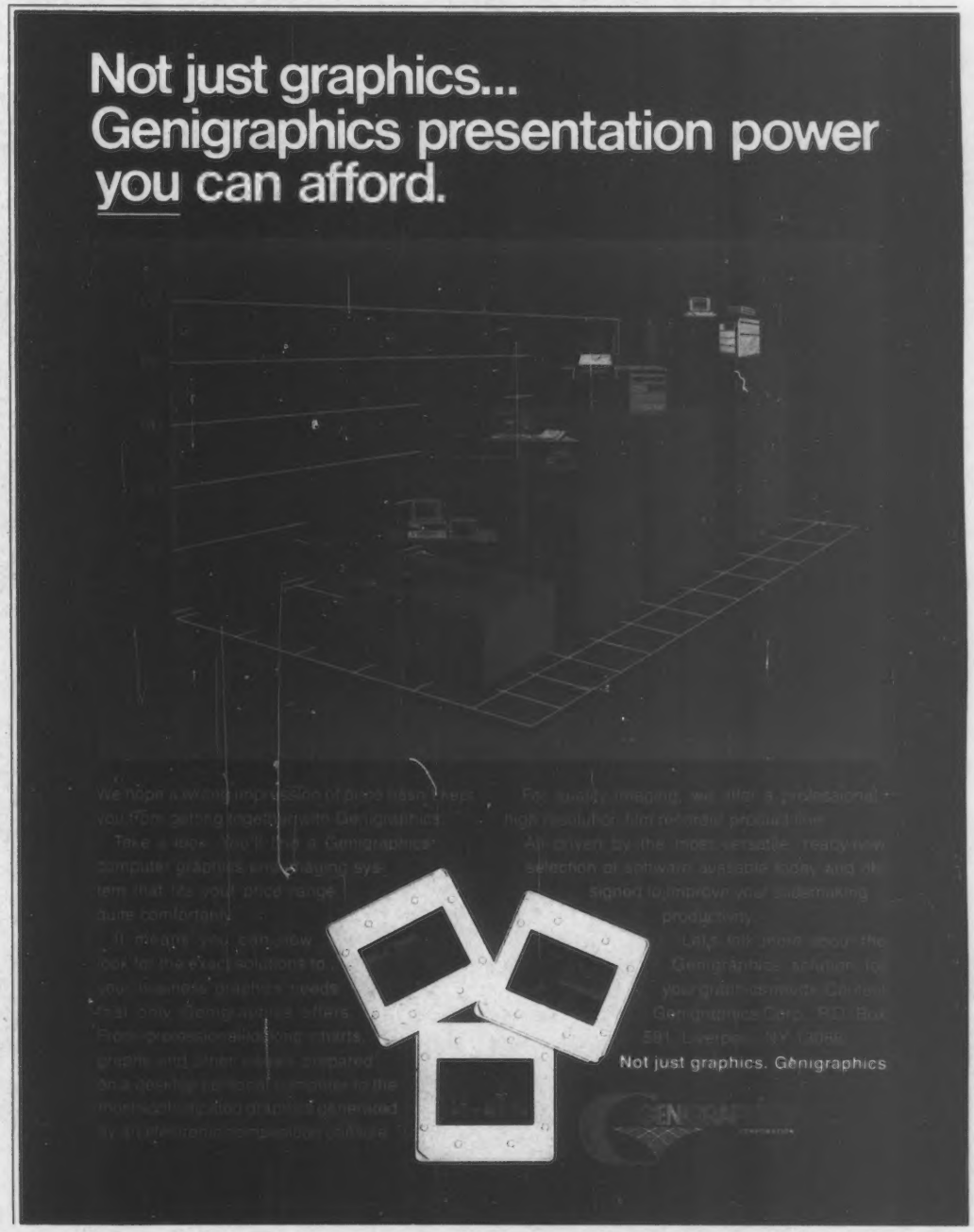
NSTA's present monopoly is scheduled to be disbanded on July 1.

WEST GERMANY

STUTTGART — Bombings and fire attacks on computer centers reached a peak recently. On Jan. 19, a fire was reported on Sydat in Karlsruhe, followed by a bomb blast at Rechensentrum Bau Gmbhand in Berlin on Jan. 20. On Jan. 21, Stuttgart-Vaihingen was bombed along with a bulding near an IBM facility in Berlin. The terrorist claimed to have been responsible for the bombing was killed during the last explosion and was identified as Johannes Thimme, 28, a member of the Red Army Faction. The bomb caused $1 million in damages.

Since Dec. 4, more than 40 such attacks have been reported. According to the Federal Criminal Police Office, 17 bombings and 45 fires were committed during the first quarter of 1984 alone. Security expert Reiner von zur Muehlen estimated that 24 bombings were targeted at computer centers last year. A *Computerwoche* survey revealed that more than half of all computer centers have taken no precautions against such bombings.

The Red Army Faction has claimed responsibility for attacks in protest of American business interests and military installations in West Germany.



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For applications with reams of output, like business accounting or complex scientific programming, the LA210's 9x7 dot matrix printhead will print up to 240 characters per second, or a full double-spaced page every 10 seconds.

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Flick a switch and the LA210 shifts to an 18x33 matrix for crisp, near-letter quality copy at up to 40 characters per second.

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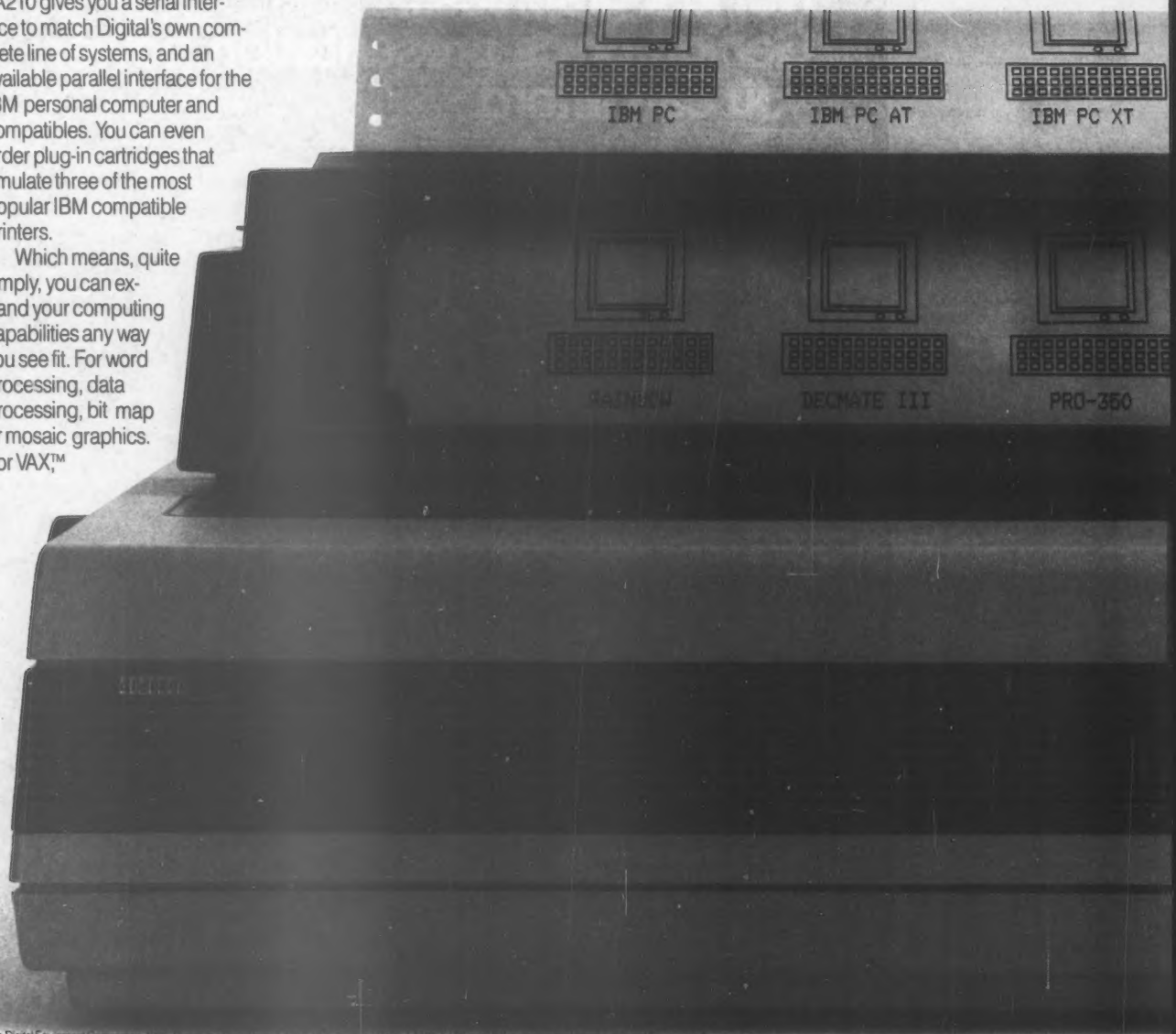

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plus Digital's VT100™ line drawing set. And it gives you a choice of more than 35 optional faces and fonts – Courier, Orator, Gothic, APL, and italics as well as special custom fonts – through plug-in cartridges that let you vary your type face even more. Finally, the LA210 lets you print bold or condensed and change faces or fonts on a dynamic character-by-character basis. So your output is truly customized to suit just about any presentation you have in mind.

Plug-in cartridges also allow the LA210 to emulate three of the most popular IBM compatible printers – the IBM Graphics Printer, the Epson MX80™ with mosaic graphics, and the MX80 with Graftrax™ bit map graphics. So you can produce charts and graphs with all the resolution and professional look of bit map graphics. Yet still retain complete compatability with software that generates mosaics.

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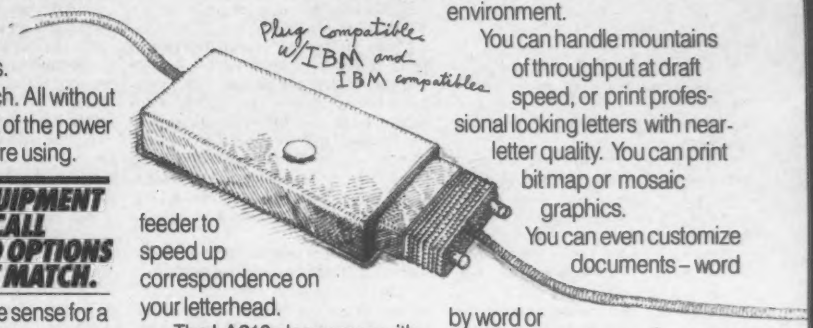
It wouldn't make sense for a printer this versatile to lack any of the features you really need.

So standard equipment includes a 2k buffer and adjustable forms tractor with acoustic cover.

Making the LA210 one of the quietest printers in its class as well as one of the fastest.

Add the optional bi-directional tractor, and you can easily handle superscripting and subscripting and full page reverse for multiple column printing.

There's even a cut sheet feeder to speed up correspondence on your letterhead.



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TURNAROUND TIME

Larry Long

***Q** I used to be with a firm that is an instrumentality of government. Neither state law nor published policy allowed me to see my record of employment.*

They asked me to do work that was not part of my job description. After some time I was told that I was judged lacking in qualification for the applicable job description (in the computer field), and they asked me to find employment elsewhere. It would seem that they changed my job classification in their records, but never allowed me to know or discover that.

In my judgment, that constitutes falsification or fabrication of an employment record. What do you think?

It is a rare individual who would hire a person for one position, then secretly apply the criteria of another position when evaluating that person's performance. Either your managers were attempting to set new standards for unmitigated gall and stupidity, or they were simply crass in the manner in which they released you. I expect the latter.

Many employers hold sacred that portion of an employee's record that deals with performance evaluations, but, I cannot imagine an employer not releasing such basic information as an employee's job classification.

***Q** I am now a junior and will graduate with a degree in computer science. Most of my courses during my senior year will be electives in my major. My college has a large computer science department with a good selection of courses. Which specialty areas would give employers added incentive to interview me?*

Generally speaking, I would recommend that you select courses that will broaden your perspective on the field of computers. That is, if you have had Pascal I and II, avoid Pascal III and IV. See if there is a special projects course that will permit you to address a single multifaceted problem over the duration of a term. Ideally, the emphasis of such a course will be on logic and design and not on syntax and mechanics.

Besides the degree itself, an employer might be favorably impressed if you had at least a one-course exposure to each of the following areas: graphics, C programming, artificial intelligence and data communications and networking. I mention these because they are not required in many undergraduate computer science curricula.

"Do you have any other qualifications?"

***Q** My boss handed me your definition of computer literacy [CW, Jan. 14] and asked me to put together a program that would result in our middle and upper division management people becoming computer literate. I run an information center with a staff of three, and about half of our intended audience has used our facilities at one time or another. However, I doubt if more than a couple would call themselves computer literates.*

I am concerned about our managers' willingness to devote time to attaining computer literacy. Before we get the program off the ground, we need to request a certain amount of time from our managers. Could you give us some guidelines as to how much time will be needed?

A willing manager, starting from scratch, can expect to achieve computer literacy after about 120 hours of study and practice. I would suggest that approximately 40 hours of that time be devoted to reading and study, interaction with pedagogical software and perhaps some classroom (or small group) instruction. Another 40 hours could be devoted to developing skills in specific software, such as financial planning, and generalized software, such as query languages, that is specific to your organization and to their job function. The remaining 40 hours could be devoted to drill and practice in the use of this software. I want to emphasize the importance of the last 40-hour segment. Any training on concepts and software that is not put to use is soon forgotten and never really appreciated.

Relatively few managers are willing to pull themselves away from their routine activities for 120 hours. As a compromise, why not propose that a 40-hour program be conducted during work hours over a two-week period. Then make computing resources and expert assistance available to them during both work and after-work hours so that they can complete the program. You will need to structure the latter two segments of the program with specific work challenges and deadlines, otherwise participation will die off quickly. The time spent on the self-paced portion of the program will, of course, vary considerably depending upon the managers' interest and willingness to learn.

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CALENDAR

WEEK OF JAN. 27

JANUARY 30-31, SAN JUAN, PUERTO RICO — **Pan-American Conference and Exposition on Document-Based Information Systems.** Contact: International Information Management Congress, P.O. Box 34404, Bethesda, Md. 20817.

FEBRUARY 1, NEW YORK — **Advanced PC-DOS.** Contact: Center for Advanced Data Processing, Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

FEBRUARY 1, PITTSBURGH — **Finite Element Modeling and Analysis.** Contact: Valerie Brosdal, Ridge Computers, 2451 Mission College Blvd., Santa Clara, Calif. 95054.

FEBRUARY 2, NEW YORK — **IDMS CV Generation.** Contact: International Computers & Communication Systems, Inc., 10 E. 21st St., New York, N.Y. 10010.

FEBRUARY 2-3, SAN FRANCISCO — **Softeach Seminars.** Contact: Softsel News Bureau, Suite 210, 160 Newport Center Drive, Newport Beach, Calif. 92660.

WEEK OF FEB. 3

FEBRUARY 3-6, NEW ORLEANS — **1985 Telecommunications and Financial Networks Conference.** Contact: Kit Stevenson, American Bankers Association, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

FEBRUARY 4, NEW YORK — **Vsam for Application Programmers.** Contact: International Computers & Communication Systems, Inc., 10 E. 21st St., New York, N.Y. 10010. Also being held Feb. 11-15 in New York.

FEBRUARY 4, NEW YORK — **Displaywrite 2.** Contact: Center for Advanced Data Processing, Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

FEBRUARY 4, NEW YORK — **Introduction to the IBM Personal Computer.** Contact: Center for Advanced Data Processing, Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

FEBRUARY 4, COLUMBIA, MD. — **How to Write Better Technical Reports, Proposals and Papers.** Contact: Center for Management Development, University of Maryland, College Park, Md. 20742. Also being held Feb. 5 in Rockville, Md., and Feb. 6 in Reston, Va.

FEBRUARY 4-5, NEW ORLEANS — **Unix Seminar.** Contact: U.S. Professional Development Institute, Unix and C, 1620 Elton Road, Silver Spring, Md. 20903.

FEBRUARY 4-5, WASHINGTON, D.C. — **Managing the Data Center.** Contact: New York University, School of Continuing Education, 575 Madison Ave., New York, N.Y. 10022.

FEBRUARY 4-5, ST. PETERSBURG, FLA. — **The Second Annual Frost & Sullivan Automated Manufacturing Conference.** Contact: Wendy Engelberg, Frost & Sullivan, Inc., 106 Fulton St., New York, N.Y. 10038.

FEBRUARY 4-6, SAN FRANCISCO — **Culprit/EDP Auditor: Concepts and Practice.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

FEBRUARY 4-6, SAN FRANCISCO — **Auditing in a Data Base Environment.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

FEBRUARY 4-6, SAN FRANCISCO — **Controlling & Auditing On-Line & Distributed Systems.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

FEBRUARY 4-6, ATLANTA — **1985 Office Automation Conference.** Contact: American Federation of Information Processing Societies, Inc., 1899 Preston White Drive, Reston, Va. 22091.

FEBRUARY 4-6, DALLAS — **Automating the Office: A Tactical Guide for Success.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

FEBRUARY 4-6, ATLANTA — **Data Base: A Manager's Guide.** Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

FEBRUARY 4-6, WASHINGTON, D.C. — **Introduction to Data Communications.** Contact: Systems Technology Forum, 9000 Fern Park Drive, Burke, Va. 22015.

FEBRUARY 4-6, WASHINGTON, D.C. — **X.25 and Packet-Switching Networks.** Contact: Systems Technology Forum, 9000 Fern Park Drive, Burke, Va. 22015.

FEBRUARY 4-6, SAN FRANCISCO — **Networking Personal Computers.** Contact: Systems Technology Forum, 9000 Fern Park Drive, Burke, Va. 22015.

FEBRUARY 4-6, SAN FRANCISCO — **IBM's Systems Network Architecture: Audit & Security Concerns.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

FEBRUARY 4-6, SAN FRANCISCO — **Computer Security for the Security Professional.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

FEBRUARY 4-6, PARSIPPANY, N.J. — **Vsam in Cobol.** Contact: Chubb Institute, P.O. Box 342, 8 Sylvan Way, Parsippany, N.J. 07054.

FEBRUARY 4-6, WASHINGTON, D.C. — **Digital Private Branch Exchanges.** Contact: Systems Technology Forum, 9000 Fern Park Drive, Burke, Va. 22015.

FEBRUARY 4-6, DALLAS — **Systems Project Management.** Contact: Thomas Bisacquino, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio. 44138.

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EDITORIAL

Software piracy: courting danger

There will be at least two lasting and significant effects of the antipiracy suit filed this month [CW, Jan. 21] by the Association of Data Processing Service Organizations. The first is a heightened awareness of the illegality of duplicating copyrighted software and the second, a heightened fear of the consequences.

While the suit, filed against American Brands, Inc., will likely travel a long path through the courts before concluding, it is abundantly clear that Adapso is playing hardball regarding the piracy issue.

But neither heightened awareness nor fear of retribution will do much to stop a crime that is so difficult to detect as long as DP management is willing to look the other way.

Let's face it, there are few managers who could not be aware of the rabbit-like multiplication of the two or three spreadsheet packages purchased at the start of the fiscal year. These same managers must now know that, if the piracy issue is raised in court, it is the managers — not the users — who will be on the witness stand, and the managers who will likely find themselves without a job if piracy charges are made to stick.

So, what's a manager to do? In the first place, every DP shop where micros are blossoming (which is virtually every large shop) should develop and implement an antipiracy policy.

Drafting such a policy is no big problem. The main thrust of the policy statement should be simple: Duplicating copyrighted software is illegal, regardless of whether the copies are sold, and duplicating these packages at work will be dealt with accordingly, as an illegal act.

And what of the managers' original problem — insufficient funds to meet the booming demand for micro software packages — that drove them to a life of piracy in the first place? That is a poor excuse to steal.

One of the realities of corporate life is that an effective manager must learn to live within a budget. Besides, it might be easier to get caught than you think. What if a disgruntled employee turns you in?

'On the grounds that they are capable of holding billions of bits of enemy data!'

DATA PAST

Five years ago

ORLANDO, Fla. — Harris Corp. filed a lawsuit for more than $9.3 million here against the government of Iran, charging it breached a contract that called for the company to manage the installation of a sophisticated electronic intelligence-gathering and data processing system.

WASHINGTON, D.C. — Delivery of AT&T's Dataphone II system was to be delayed up to four months, the company told the Federal Communications Commission.

Ten years ago

NEW YORK — In its pretial brief filed with the U.S. District Court here, IBM charged the antitrust suit brought by the U.S. government was "at bottom an attack on IBM's success through competition" and "a repudiation of sound antitrust precedent and policy."

LETTER

In praise of software benchmark

I want to comment on *Computerworld*'s new monthly feature on micro software benchmarks [CW, Jan.14].

I've been using Lotus Development Corp.'s 1-2-3 for several months now on my IBM Personal Computer XT with great results. It's a fine package and fills the spreadsheet requirements I have very well.

I have not used the Access Technology, Inc. 20/20 package and am therefore not qualified to comment on it, which is exactly the point.

I applaud *Computerworld*'s venture into this monthly benchmark series; it is certain to become a very popular feature because there are so many users like myself who operate relatively small systems in an isolated environment.

We are small business people who are required to perform many tasks each day and have little time to spend deciding which is the best of a variety of software packages available for a given application.

Certainly there are other publications that produce articles such as this, but I have always believed they were written more for the knowledgeable enthusiast than the small business user with a limited data processing background.

I shall greatly look forward to future installments of the software benchmark series.

This is the kind of relevant writing we've all come to expect from *Computerworld*. Congratulations.

Dave Dolber
Killington, Vt.

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VIEWPOINT

Contract programmers: a fitting compromise

MANAGEMENT MATRIX
Walter F. Cuirle

Sooner or later, usually sooner than you'd like, you run into a situation where there is more work than people to do it. Normally, this isn't a problem. The best of schedules will always have temporary overloads followed by short slack periods. But for relief from the discomforts of the occasional scheduling headache, there are always contract programmers.

Some DP shops swear by contract programmers; in some cases, a majority of the staff may be long-term contractors. Other shops swear at them. In these latter shops, managers often claim that they can't find people with exactly the skills they want and have to pay too much for what they can find.

The ideal contractor has exactly the skills and experience you want. Let's say you want someone with three years of experience in Cobol — no more than six months out-of-date — with at least one of those years in an environment the same as yours. That's quite specific, but such a person shouldn't be too hard to come by.

You pick up the phone and call your favorite neighborhood broker.

Cuirle is a senior associate with Nicholas DeMaio Associates in Bryn Mawr, Pa.

When one of the job shops on your list finds somebody with the qualifications you have specified, you have every right to expect the contractor to pick up the specifications and start right in on coding.

Unfortunately, it is not always that simple. Every manager who deals with job shops should expect to review candidates that have almost but not quite all the qualifications required.

This is normal, and a good shop will offer candidates who come close to meeting your requirements while continuing to look for the perfect match.

The problems begin when the parties involved try to decide how close a match is close enough. Some managers insist on a perfect match or none at all. That could be a mistake.

> *Some DP shops swear by contract programmers; in some cases, a majority of the staff may be long-term contractors. Other shops swear at them.*

Gray hair and a nervous twitch

Look at it from the broker's point of view. Did you ever wonder why so many of them have gray hair and a nervous twitch? It's a hard life. On the one side, they have a stable of programmers, half of whom answer the phone with "sixty an hour" instead of "hello." On the other side, they have an array of beady-eyed DP managers. Certainly, a broker's job is to match up a client's needs with a programmer's skills, but a good broker's most important asset is his reputation.

Given half a chance, and some room to maneuver, a knowledgeable broker really won't waste your time.

Now look at it from the contractor's point of view. A contract programmer's strength is depth of experience in a specific skill. This means that you, the client, can expect and get immediate production. That same programmer's weakness is usually lack of breadth.

It's hard to get the opportunity to pick up new skills as a contractor, and good ones know the value of continuing education. You can make a living out of knowing CICS, for example, but you can't make a career out of it.

Next time, try making up three skills lists for your broker instead of just one. The first list should contain your requirements for immediate productivity. Assume no learning time, but offer — and expect to pay — the highest rate for any contractor that fills these specifications. For the second list, you can specify the same depth of experience but in areas that are related, rather than identical, to the skills you need.

Finally, specify your absolute minimum requirements. This list should be looser than the second, allowing for less experience in a larger variety of areas related to your final needs. Naturally, you offer lower rates for the second two lists.

Rate vs. skills scale

What you've done here is set up three points on a rate vs. skills scale. The brokers should like this system because they will have a larger number of programmers they can fit on the broader scale. At the same time, your variable rate still motivates them to find a match as close as possible to the top of your scale.

The contractors should like it because you are offering them the relatively rare opportunity to broaden their skills.

You should like it because your needs will get more attention, you will have a broader field to pick from, and you are therefore likely to find someone to fill the position sooner than you would with a single, fixed list.

If you are astute at picking candidates who appear to be quick studies, you'll still meet your schedule, and you are likely to do so for less money.

This method works best on your longer term projects. Keep your sense of humor. Sure, you may get a Logo hobbyist presented as qualified to pull down $45/hour in your operation, but look at the bright side. Those resumes can really brighten up an otherwise dull, afternoon staff meeting.

Infusing quality in the corporate culture

QUALITY
Wayne Smith

In the last installment of this column [CW, July 30], I stated that the quality of MIS products was more a function of the management culture in an MIS organization than a result of the effectiveness of any of the individual tools and methods. In this article, I would like to discuss several examples of what I mean.

An important principle in any quality program is the principle of coverage. Coverage is a testing or validation term that represents the degree to which a particular product has been fully exercised by a given set of test cases. For programs and other software products, the expression "fully exercised" is stated in lines of code, decisions, branches and so forth. For example, the ratio of statements that were executed by a given set of test cases compared with the total statements in the program becomes the coverage (in this case statement coverage) for that set of test cases.

The principle of coverage states that the greater the coverage, the greater the likelihood of discovering the next defect in that product. In general, high coverage means fewer latent flaws; conversely, low coverage means more latent flaws.

If you believe that defects are exceedingly expensive, and further, cost you exponentially more as the development cycle advances, then the principle of coverage becomes a very important weapon in your overall campaign to reduce your development and maintenance costs.

Smith is vice-president, specializing in quality, at Applied Information Development, Inc. in Oak Brook, Ill.

Vital part of MIS culture

Coverage is a quality principle. The central issue is how to translate this principle, desirable as it may be, into an actionable element of your quality program. For software products, this coverage principle can be implemented relatively easily by several products on the market today. But, the key to making the principle of coverage a truly valuable component of your quality program is to make it a vital part of the vocabulary, thought processes and culture of your MIS organization.

Let's start with a fairly simple example. Assume an organization wants to adopt the coverage principle as a part of its overall program development quality program. This means that whenever a program is to be developed, specifications are written that define the functions, rules, inputs and outputs for that program together with a test plan. This test plan defines the test cases and expected results that were developed by the system architect or analyst. It also serves as the basis for the acceptance of that program by the programmer and the analyst.

This approach implies that for a program to be considered complete and acceptable, the programmer must not only develop a source program from the attached specifications, but the program must be validated by demonstrating that it meets the expected results in the associated test plan. In addition, since the coverage principle is being implemented, a coverage report must also be part of the turnover documentation.

A coverage report will typically indicate which portions of the program were executed and which were not. This coverage report must show that the programmer, via the test plan that was included in the specifications together with any test cases the programmer has added, has achieved some predefined level of coverage (greater than 85% is not unreasonable for statement coverage).

Fallen by the roadside

The coverage principle has now been integrated into the program development process at the unit test level. But, is it yet part of the culture? Clearly, more is required. We all know of many good techniques that have fallen by the roadside because they weren't picked up by management and thereby perpetuated.

Accordingly, we can now take this principle and apply it to different levels of testing. But more important, we must include coverage measures as part of our routine status reporting and management reporting.

An effective technique is to include, with each program's status, a summary of the corresponding coverage for that program. This step is vital to the cultural change.

The goal here is to slowly redefine the nature of

See COVERAGE page 34

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VIEWPOINT

LETTERS

Language not DBMS double

This is in response to the article "DBMS role in fourth-generation languages" by Ken Zearfoss [CW, Dec. 17].

Zearfoss's overall point is well taken: Let the buyer be wary of fourth-generation language products that falsely claim to offer data base management system (DBMS) capabilities. However, permeating the article is the assumption that these high-level languages somehow could or should double as DBMS. Therein lies a problem of definition.

A fourth-generation language is simply a high-level programming language, a means of writing programs with less procedural code. A DBMS manages access to and relationships among stored data. The DBMS is responsible for the four functions Zearfoss names: logical access, logical units of work, data sharing and recoverability.

A good fourth-generation language is a shorthand method of giving instructions to either a full-fledged DBMS or a simple file manager. If a fourth-generation language is coupled only with a file manager, then it clearly should not be used in applications requiring a DBMS.

Thus, the question is not "Does a given fourth-generation language provide all necessary DBMS functionality?" but rather "Is a given fourth-generation language sufficiently integrated with a good DBMS?" In other words, can you write applications programs, including updates, in a fourth-generation language and, through high-level instructions or logical defaults, have the DBMS perform its work of ensuring data integrity and consistency?

Unfortunately, Zearfoss's experience has not included any fourth-generation language that is closely coupled with a full DBMS. Such products do exist, and they have been used to build multiuser systems, even in complex applications like order service and manufacturing control.

These applications run in production with full data integrity, concurrency and recovery facilities and without any of the laborious code (for example, code to handle data contention) that the article describes. Fourth-generation languages are even serving as source languages for full-function applications software packages.

Your readers should keep in mind both the distinction between fourth-generation languages and DBMS and the value of having them work together.

Bob Morison
Burlington, Mass.

COVERAGE from page 33

the dialogue between developer and manager so that terms such as coverage are important and recurring elements of that discussion. Managers should begin to realize that coverage is important to them and is a more precise way of defining testing effectiveness than the traditional technique of testing until time runs out. Low coverage is very expensive and unnecessarily risky.

Incorporating this principle into the management culture is actually quite straightforward. The coverage principle is first translated into a set of techniques that can be properly utilized by the staff in a usable, practical manner. These techniques are then integrated into the development methodology in order to discipline their usage.

Incorporate into training program

Finally, the principle is incorporated into the status and management reporting mechanisms so that it becomes part of the vocabulary and thought process of senior management. This principle must also be reflected in the organization's training program.

A further incorporation of the coverage principle can be achieved by adapting the concept for use in user acceptance testing. The idea here is to apply coverage not to lines of code, or other software constructs but rather to business requirements. If one considers that a system must meet a set of user-oriented business requirements before it can be considered acceptable, then it is reasonable to design an acceptance test plan that has a high level of coverage with regard to these requirements.

As in the earlier example, simply define a threshold (here, 100% of requirements might be the target) and incorporate this technique into the acceptance process. First specify the requirements in detail. This involves training the users in this new process so that they can assist in the requirements specification. Then, define a set of test cases and expected results in such a way that each requirement is covered by at least one such test case.

Here coverage involves a more subjective assessment, but such an approach nonetheless yields a substantial improvement in ensuring that the system or package meets the users' requirements.

Actual vs. expected results

Acceptance testing can proceed on this basis and requirements are considered covered when all their associated test cases have been successfully executed. That is, when the actual results are found to be equivalent to the expected results.

Again, as in the earlier example, this principle is further incorporated into the culture by including requirements coverage levels in the periodic status and management reports. In this case, requirements coverage reports that show which requirements have been covered and which are yet to be covered provide a simple but very effective means of evaluating the true progress of acceptance testing.

Developers, managers and users are now talking in terms of coverage, and as it becomes a legitimate element of their status reviews, management reviews and steering committee minutes, it becomes more completely integrated into the management culture of the MIS organization.

Cultural changes, even relatively minor ones, are often slow and painful. They require legitimation by the staff. They must make sense. They must be practical and clearly beneficial. But most of all, they must become a routine part of the way management thinks and acts.

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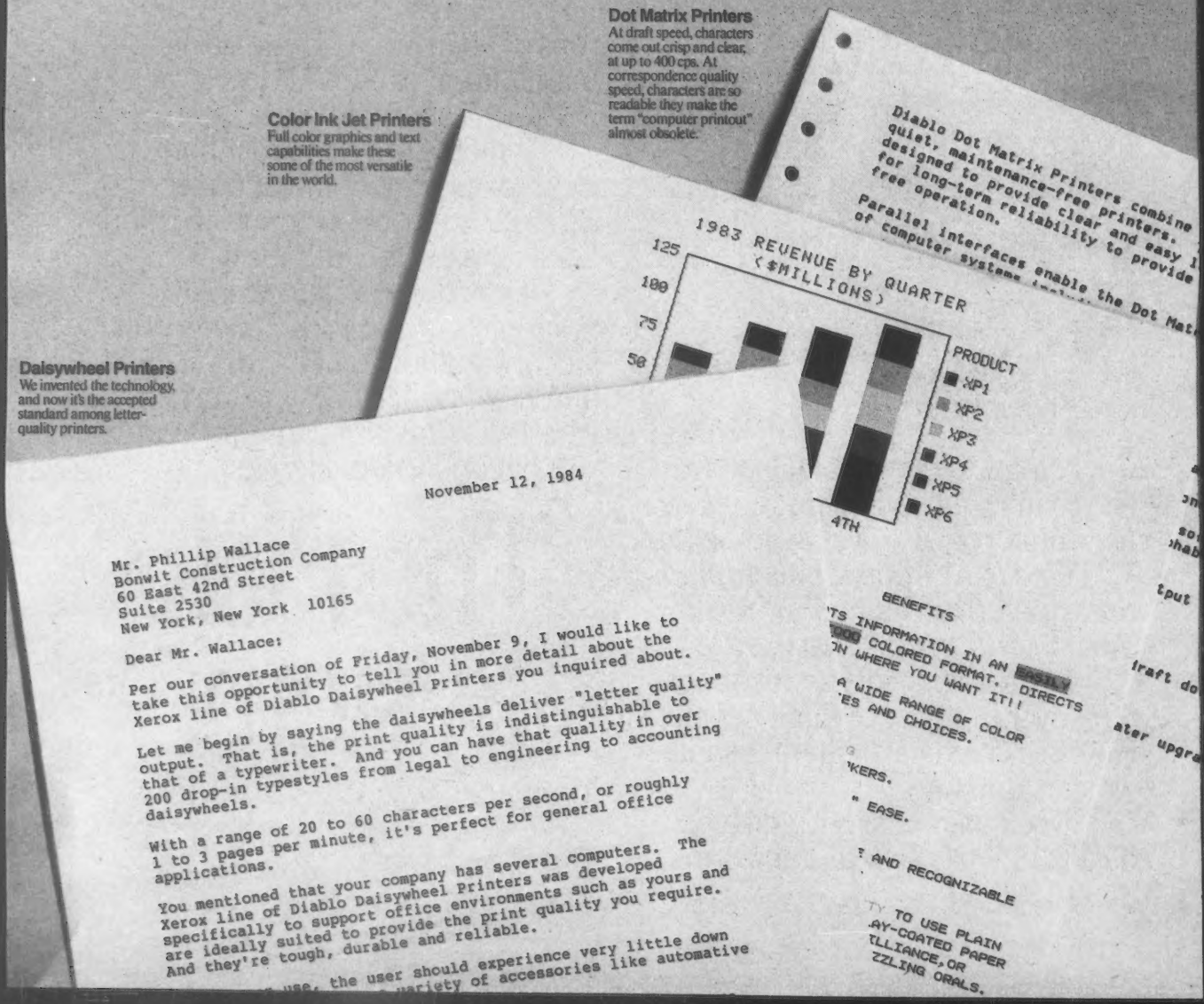

SOFTWARE & SERVICES

SOFTLINE
Gerald W. Lanning

Simplifying documentation

Writing and modifying documentation for the user can be very time-consuming and expensive. Often it has information the user seldom reads or it does not have enough definition to be understood.

Documentation must be on a level everybody can understand. And the simplest documentation needed is the one that describes the data that is to be captured — a method that is cost-effective and provides a communication tool for management and one that will eliminate extensive documentation costs.

The method is called a user dictionary. It is so simple that it is surprising it was not thought of before. The user dictionary describes the data and code requirements of each field of a file. Just as you refer to the English dictionary for a word you do not understand, the same concept applies to the user dictionary. When a user is unfamiliar with a term or phrase, the dictionary can provide the answer. In addition, the dictionary provides a tool for management to communicate its needs to the programmer.

Using such a documentation method requires the cooperation of both the DP staff and the user responsible for the information. It is up to both to provide the criteria of each field. When new data fields are discovered, they must be fully defined and then arranged in the appropriate files.

For example, if the user needs to store an invoice number for future use, he would describe this field as invoice num-

See **DOCUMENT** page 38

Lanning is a senior programmer/analyst at Nebraska Western College in Scottsbluff, Neb.

PDSMAN capability stretches memory for bank programmers

By Sharon Stahlheber
Special to CW‡

HARTFORD, Conn. — The data processing division of Connecticut National Bank here is graded by management according to disk storage availability and response time in the IBM TSO environment. The goals are 100% availability and subsecond response.

In March 1983, however, the company was having a difficult time achieving its goals. "We needed a way to eliminate the number of compresses we were performing on Dasd [direct-access storage device] libraries," said Assistant Vice-President Richard Schaefer. "We simply needed to control our overhead."

> *'We simply needed to control our overhead.'*
> **— Richard Schaefer Connecticut National Bank**

The bank decided that the Free Space Reuse capability of PDSMAN from Goal Systems International, Inc. would provide the most control with the least impact on the computing environment. Free Space Reuse watches for any blank disk space, reorganizes stored material in real time and aggregates any unused disk portions.

"Installing PDSMAN was done simply and without fanfare," Schaefer said. "The first realization our programmers had of the new software was that they weren't running out of space anymore. We no longer needed to do compresses four times a day and response time remained acceptable."

Schaefer explained that in order to maintain efficient storage under TSO prior to installing PDSMAN, the library needed to be compressed regularly. If compresses were scheduled and performed on time, problems rarely occurred, he said. However, each compress burdened the operations

See **BANK** page 47

Stahlheber is a partner with Corporate Communications Associates in Annapolis, Md.

IBM link hooks micros to CPU

PC/VM Bond allows Personal Computer users to enter mainframe for VM system capabilities

WHITE PLAINS, N.Y. — IBM has introduced a microcomputer-to-mainframe link that allows users of its Personal Computer to make use of IBM VM operating system services on the mainframe.

According to a company representative, PC/VM Bond consists of two programs — VM Bond on the micro side and PC Bond on the mainframe — that enable a Personal Computer user to access VM capabilities. The link allows the Personal Computer to use large system disk storage, provides for data sharing among Personal Computer users, facilitates message services and features a command interpreter for the micro and full screen IBM 3278/79 terminal emulation capabilities.

The representative said that VM Bond provides the Personal Computer user with virtual disks that reside on the VM host system, although they appear to exist on the micro. There is no limit to the number of disks that the user may define and share with other users. Up to eight virtual disks may be actively accessed by IBM's PC-DOS operating system at one time, and the disks may range in size from a minimum of 2K bytes to a maximum of 32.7M bytes. The disks can be accessed through normal PC-DOS commands. In addition, services are provided to allow text or bina-

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- Cap Gemini DASD has announced a translator that converts Fortran code to run on other Fortran compilers/**40**
- Inspiration Systems, Inc. has introduced a series of applications and development products for the AT&T Unix operating system/**40**
- Software International Corp.'s Smart Link now supports IBM's IMS/DC environment/**41**
- Oracle Corp.'s Oracle data base management system will soon be available under Amdahl Corp.'s UTS operating system/**41**

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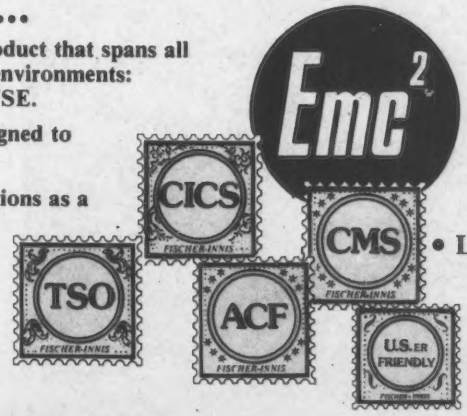

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SAMPLE USER DICTIONARY ENTRIES

User Definition USRDEF
30 Characters Alpha (Mandatory)
Purpose: Describes the field in general terms.
Responsibility: User
Supplier: End user
Values: None

Programmer Definition PGMDEF
10 Characters Alpha (Mandatory)
Purpose: Describes the field name used for coding programs.
Responsibility: Data center
Supplier: Data center
Values: None

User Description Array USRDEF
350 Characters Alpha (Mandatory)
Purpose: This is a five-element array of 70 characters each, describing in detail the information to be captured.
Responsibility: Data center
Supplier: End user
Values: None

Length of Field LENGT
5 Characters Alpha (Mandatory)
Purpose: To describe the length of the data field used.
Responsibility: Data center
Supplier: User/DP
Values: None

Character Type CHRTYP
1 Character Alpha (Mandatory)
Purpose: To describe the type and use of the data field.
Responsibility: Data center
Supplier: User/DP
Values: A = Alphanumeric $ = Dollar Amount
N = Numeric % = Percentage Figure
D = Data T = Yes/No

Responsible RSPCDE
2 Characters Alpha (Mandatory)
Purpose: To describe the person or persons responsible for the data field criteria.
Responsibility: Data center
Supplier: Any user
Values: DP = Data Center US = User Department
AU = Any User EU = End User
UD = User/Data Center JD = John Doe

Supplier SUPCDE
2 Characters Alpha (Mandatory)
Purpose: To describe the person or persons responsible for supplying the data.
Responsibility: Data center
Supplier: Any user
Values: DP = Data Center US = User Department
AU = Any User EU = End User
UD = User/Data Center JD = John Doe

Figure 2 CW CHART

DOCUMENT from page 37

ber and give a description of its use and intent. The programmer or analyst responsible for design would be required to provide the size and character type along with a field name used in files and programs.

For example, a six-character alphanumeric field named INVNUM could be used. At this point, the data field links the user with the programmer. So when the user needs a report using the invoice number, the programmer can cross-reference and find the name used in the file.

Implementing such a system requires three basic files: the data field description file, data codes file and the program description file. Each file contributes to the user dictionary system supplying data field definitions, codes and purpose of programs written by programmers.

The data field description file is used as the master or driver. It retains the use and intent of the field, plus any extra information needed. The data codes file provides the codes of each field. This file consolidates all the table files currently on the system. The program description file just keeps track of all programs, job control programs or files created by the programmer.

Program description file

The program description file in Figure 1 gives a better understanding of the user dictionary. The file name FDATA is used to identify a file layout or program entered in the computer system. FDATA is entered into the field name PGMNAM. The data field description file found after the file name is an extended description of the file or programs. The information is then stored in the PGMDES field. The information relating to the purpose and intent of

SFTLIN2A KIM .01/11.12:33 KIM-PRO
11-JAN-85 12:35:21

SAMPLE DATA CODES

FDATA — Data Field Description File
Purpose: The data field file describes each data field of all input and/or output files for capture of company information. This file will handle all working storage fields as well.

Created date: 01/01/80 Created by: GWL
Modified date: 06/06/81 Modified by: John

FDCDE — Data Code File
Purpose: The data code file retains all code requirements of a designated data field. This file describes codes in the same manner as a table file.

Created date: 01/01/80 Created by: GWL
Modified date: Modified by:

FDPGM — Program Description File
Purpose: The program description file describes each program, sort, job routine and input or output file created by programmers.

Created date: 01/01/80 Created by: GWL
Modified date: 10/08/82 Modified by: Susan

Figure 1 CW CHART

files, programs and job control routines is found in the PURPOS field.

The CREATED DATE and CREATED BY fields indicate the date and programmer who created the first source code. The information is entered in the CRTBY and CRTDTE, respectively. Finally, the MODIFIED DATE and MODIFIED BY fields keep track of the dates and programmers modifying the source codes, and entry is in the field names MODDTE and MODBY, respectively.

Figure 2 provides further information about the elements of the data field description file and data code file.

DP staff can control files

This should offer an idea of each file's use. Imagine the control the DP staff has on the files and programs written. The file also has potential Help instructions that can be implemented in all menu-driven programs.

With the ability to provide the necessary information of each data field, entry for unfamiliar input needs can be referenced in the same manner the English dictionary is referenced.

The computer was designed to store data about the company and the user dictionary is about that data. With this method, you can eliminate the time your personnel needs to read extensive documentation.

As a tool for management, the user dictionary provides a communications link between what is needed on a report and how the programmer can find the code. By selecting from the user dictionary the necessary criteria needed, management is in control of its data.

Fourth-generation tools do not replace Cobol: IDC study

By Maura McEnaney
CW Staff

FRAMINGHAM, Mass. — Fourth-generation languages are not a replacement for Cobol and when used as such can cause the loss of a competitive advantage, poor response times and unnecessary hardware additions for MIS directors, according to International Data Corp. (IDC).

In a recent report entitled "Fourth-Generation Languages: Information Generators to Meet Information Needs," the consulting company's Information Systems Planning Service expressed what it called "restrained enthusiasm" about the impact that fourth-generation languages have on programmer and MIS productivity.

"Fourth-generation languages will not replace Cobol or lead to Cobol's obsolescence," the report asserted, but are most effective when used as a "prototyping-only aid for mainstream Cobol programs or full implementation of seldom-run Cobol-type applications."

Summaries of information

Used as the basis for a decision support system (DSS), fourth-generation languages can help non-MIS and mid-level managers plan and model their business growth by providing timely summaries of business information, IDC said.

Because they significantly reduce coding requirements, fourth-generation languages save MIS programmers "enormous development energies," when they are used as a prototyping tool for large Cobol-oriented applications, IDC said. The languages can reduce MIS software maintenance and work to decentralize MIS by making area managers more accountable for their MIS requirements.

However, Cobol and fourth-generation languages are designed for two types of users, according to IDC. Cobol's hierarchical data base best handles the high-volume applications used by operations and accounting groups, while the relational data base structure and decision support strengths of fourth-generation languages make them appropriate for managerial planners.

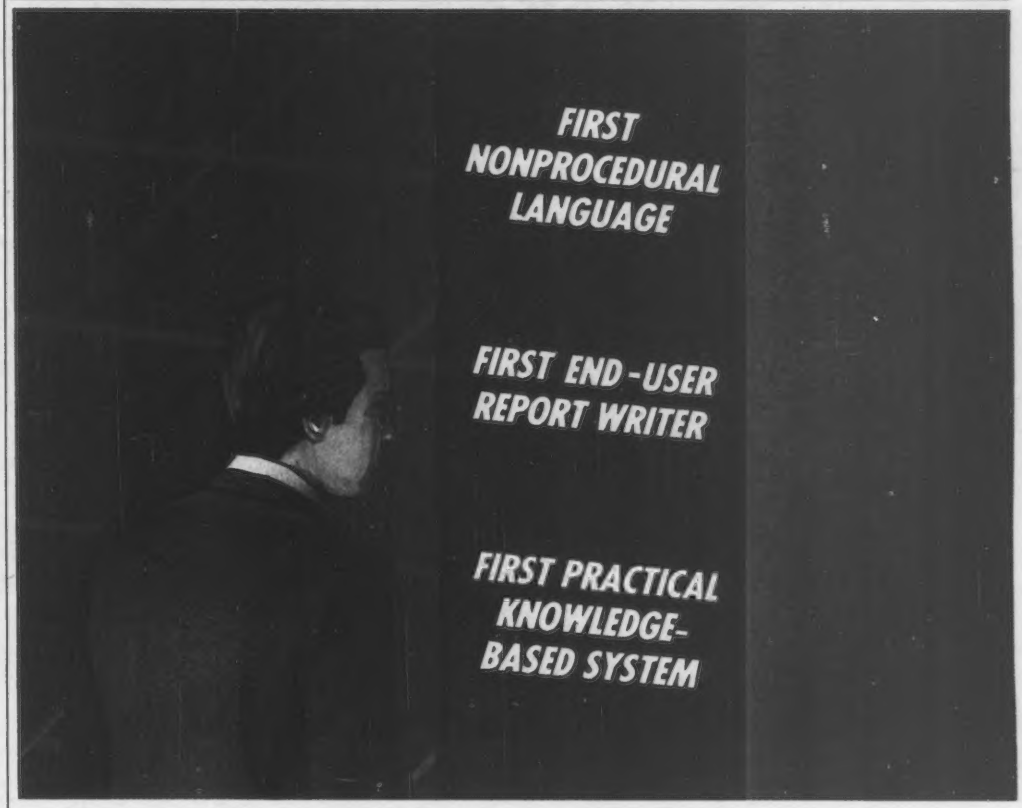
IDC reported that the use of fourth-generation languages will not help decrease the backlog of traditional Cobol needs. According to the report, however, they can be used to reduce the backlog of any DSS-related applications.

While the IDC report maintained that it is "very positive" about the benefits of fourth-generation languages as productivity tools, it alerted managers to several problem areas. These include lack of language standards, limited portability, the need to implement new releases, data security, poor product documentation, data transportation problems, storage issues, vendor support and shortage of fourth-generation experts.

Despite those problems, an IDC survey found that most fourth-generation language installations are used in companies employing IBM's VM or MVS operating systems, suggesting that "bigger shops are acquiring most of the fourth-generation languages software. In addition, fourth-generation languages are being used in nearly all industrial groups."

The report said the largest users are the durable manufacturing industry, which absorbs 22.4% of the language sales; financial services (17.4%); and nondurable manufacturing (17.4%).

The report is available for $650 from IDC Information Systems Planning Service, 5 Speen St., Framingham, Mass. 01701.



The most experienced 4th-generation software. . .

CGD adds Fortran translator in free-form, formatted code

MILWAUKEE — Cap Gemini DASD (CGD) has introduced a version of its Fortran-to-Fortran translator that is capable of handling the translation of formatted and free-form Fortran to any other Fortran. The translator is available in an IBM OS/MVS environment, and CGD will act as a service bureau for users without that environment.

The translator produces a listing of translated programs and line-by-line diagnostic messages and comments, the vendor said. If variable names need to be truncated, the translator produces an old name/new name cross-reference table at the beginning of each program.

When the code is reformatted, all statements can begin in column seven, or "do" loops and "if" blocks can be indented, according to the vendor. All labels and label references are optionally resequenced in increments of 10.

The license fee ranges from $19,000 to $24,000. Translation is also available on a per-program, per-line basis.

CGD can be reached at P.O. Box 23676, 9045 N. Deerwood Drive, Milwaukee, Wis. 53223.

Inspiration Systems offers Unix-based DBMS package

SEWICKLEY, Pa. — Inspiration Systems, Inc. has announced a family of software products, based on AT&T's Unix, that is built around a common user interface and that combines applications with a relational data base management system (DBMS) and applications development facilities.

According to a spokesman, the Prevail series is built around a relational DBMS core and integrates an end-user interface with word processing, spreadsheet, communications and report writing modules and applications development tools. The user interface is described as a user-access shell that incorporates windowing capabilities, adaptive and permanent function keys, menus, a common command set with a spelling checker, a full screen editor, Help screens and a data integration facility that allows for sharing of information between Prevail components.

Prevail's components reportedly can be configured in any combination and are designed to operate across a variety of machine types. Hardware currently supported includes Digital Equipment Corp.'s VAX series, NCR Corp.'s Tower minicomputers, AT&T's 3B series and Masscomp Co., Parallel Computers, Inc. and Sun Microsystems, Inc. processors.

Prevail's office products offerings include menu-driven word processing software that features insert, replace and cut-and-paste capabilities. It allows for multiple column layouts, automatic titles, footings and pagination and document merging. The Prevail spreadsheet offers unlimited row, column and cell capacities, arbitrary cell list referencing, natural recalculation ordering and automatic command recall. Prevail's communications software provides access to electronic mail and other network services and facilitates interactive dialogue with other Unix- and non-Unix-based processors.

The core of the Prevail series is a relational DBMS that features an integrated, active data dictionary and is designed to accommodate large data bases and multiple interactive users. The Prevail report writer/data base definition facility offers interactive Help and continuous error-checking capabilities. As users define fields and records in response to screen prompts and as new information is compiled, the system automatically checks spelling, syntax and data dictionary capacity.

System based on ADL

According to the spokesman, Prevail's application development facilities are centered around the company's Pascal-based Application Development Language (ADL). ADL is described as a full-function, procedural, high-level language. All programs generated by the Prevail report writer are internally translated to ADL source code so programmers can change or add to source code generated via the ADL. ADL handles date, arithmetic and string operations and contains structured programming control statements and I/O facilities.

The Prevail software series is scheduled for shipment in May. Pricing for modules purchased separately for use on a supermicro such as AT&T's 3B2 are as follows: user interface, $375; DBMS and report writer, $1,350; telecommunications, $450; word processing, $750; spreadsheet, $750; ADL, $450. If purchased as a package, the entire Prevail system is priced at $4,125. Prices for modules or the entire system for minis, superminis and mainframes are 50%, 100% and 150% higher, respectively, than supermicro prices.

Inspiration Systems is located at Production Plaza, Sewickley, Pa. 15143.

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Smart Link out for IBM IMS monitor

ANDOVER, Mass. — Software International Corp. has introduced a version of its micro-to-mainframe link for users of IBM's IMS/DC teleprocessing monitor.

The IMS/DC Smart Link is said to be an intelligent micro-mainframe link integrated with Software International's General Ledger and Financial Reporting System. It reportedly enables IBM Personal Computer users to download data from the General Ledger and Financial Reporting System, manipulate the data using microcomputer spreadsheet products and upload the results to the mainframe.

According to a spokesman, the link provides options that allow the same naming convention to be used when accessing amount information from the mainframe. Information is downloaded in Software Arts, Inc.'s Data Interchange Format.

Smart Link reportedly incorporates audit trails and other security features used in the General Ledger mainframe system.

The single-unit price for the IMS/DC Smart Link is $4,000.

More information is available from Software International, One Tech Drive, Andover, Mass. 01810.

SYSTEMS SOFTWARE

PANSOPHIC SYSTEMS, INC.
Panexec Version 5.1.A.

Pansophic Systems, Inc. announced a release of its management control system software for IBM mainframe users.

Panexec Version 5.1.A. is said to include such features as complete support for IBM's MVS/XA operating system; an extended architecture Linklist Look Aside Facility support for Panexec libraries; an Authorized Program Facility support of individually authorized Linklist libraries for Panexec libraries; support for 31-bit programs; and a Fetch command.

Other features are said to include a dynamic Build Directory List that allows a directory preload of Linklist libraries and the ability to display the addressing mode and residency mode attributes of Exec elements.

A product enhancement is available free of charge for users of Duquesne Systems, Inc.'s PVO and Quickfetch software products that pro-

Continued on page 42

Oracle DBMS available for Amdahl UTS users

SUNNYVALE, Calif. — Amdahl Corp. has announced that it has entered into an agreement with Oracle Corp. that will make the Oracle relational data base management system (DBMS) available under UTS, Amdahl's mainframe version of the AT&T Unix operating system.

Under the agreement, a spokesman said, Oracle will license the system directly to UTS users. Oracle's applications tools allow users to develop and maintain their own applications.

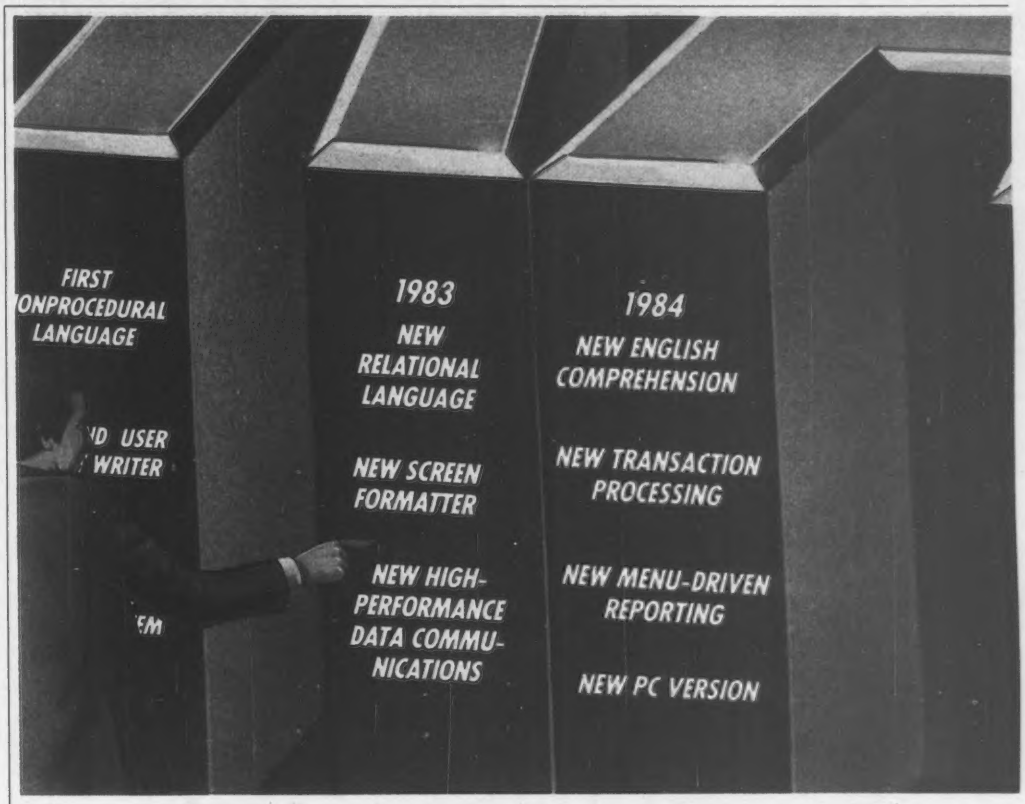
The product's applications generator allows the user to build multiuser screens for on-line data entry, query and update procedures. The Oracle relational DBMS also features an interactive report writer and integrated data dictionary.

The spokesman said the interactive report writer operates through six basic commands and allows for the output of any query to be automatically formatted into a report.

The integrated data dictionary is automatically updated and stored as part of the data base and can be accessed by all Oracle facilities.

The price of a fully supported Oracle license under Amdahl's UTS ranges from $72,000 to $120,000, depending on the Amdahl unit and processor.

Amdahl is located at 1250 E. Arques Ave., Sunnyvale, Calif. 94086.



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SOFTWARE & SERVICES

Continued from page 41

vides compatibility with Panexec, the vendor said.

A source/load cross-reference facility, %Write, provides support for Panvalet 11.0.

Users of this facility who are running prior versions of Panvalet must upgrade to Version 11.0, the vendor said.

The vendor said that because IBM has announced it will reduce support for OS/VS1, the latest release of Panexec will be the last to include guaranteed support of VS1.

Panexec is priced at $35,000 for IBM's OS operating system.

Pansophic Systems, 709 Enterprise Drive, Oak Brook, Ill. 60521.

PANSOPHIC SYSTEMS, INC.
VMLIB 2.0

Pansophic Systems, Inc. has announced enhancements to VMLIB, a source library system for IBM's CMS that operates in a native or guest system control program environment.

According to a spokesman, VMLIB 2.0 provides controls for source code accessed by multiple users and tracks changes to source code. One facility manages the development process from initial coding to testing to production and creates an audit file of all activities.

The enhanced version is said to store all changes in the form of delta files, and production-level programs are stored at their current level of maintenance.

VMLIB reportedly supports CMS/ISPF and makes use of CMS/ISPF editor features.

VMLIB 2.0 is priced at $19,500 for IBM's OS operating system or native VM with no guest operating system and $17,500 for IBM's DOS environment.

Pansophic Systems, 709 Enterprise Drive, Oak Brook, Ill. 60521.

TSI INTERNATIONAL
Docu/master enhancements

TSI International has announced enhancements to Docu/master, a storage and retrieval system for text and structured data that runs under IBM's OS or DOS operating systems.

According to a spokesman, enhancements include a columnar reporting option that offers users a paint-the-screen procedure to format any combination of structured data and text.

In addition, Docu/master now supports up to 400 users, and there is no longer a limit to the types of terminals defined in a system. The enhanced release also supports Spanish, Swedish, Dutch, English, French and German.

Docu/master is priced at $58,000 for the OS version and $45,000 for DOS. Current Docu/master users can upgrade to the latest release for $5,000.

TSI International, 187 Danbury Road, Wilton, Conn. 06897.

EMERGE SYSTEMS, INC.
Rtux Executive

Emerge Systems, Inc. has introduced a real-time support package for use on computers running under AT&T's Unix System V.

According to a spokesman, the capabilities provided by the Rtux Executive package include shared memory management, loading of resident programs, interprogram and interprocessor message-queuing services, direct sharing of memory between resident programs and scheduled processes and resident program control of scheduled process execution priorities.

The package reportedly

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provides support for resident systems mode exception handlers and scheduled real-time processes in single or distributed real-time systems.

Rtux Executive costs $2,000 for an initial license and $200 for each additional license.

Emerge Systems, P.O. Box 3175, 114 Sixth Ave., Indialantic, Fla. 32903.

INFORMATION PROCESSING TECHNIQUES CORP.
DG'C' Revision 2.25

Information Processing Techniques Corp. (IPT) has announced an enhanced version of its C compiler for Data General Corp. computers running under any mapped DG operating system.

According to an IPT spokesman, enhancements to Revision 2.25 of DG'C' include the addition of a Motorola, Inc. 68000 microprocessor cross-compiler, support of unpended I/O, I/O packet support for 32-bit DG machines running under the AOS/VS operating system, greater optimization in generated code size and speed, added debugging features and additional preprocessor facilities.

DG'C' ranges in price from $5,000 to $26,000, depending upon the configuration of the host system and the cross-compilers selected.

IPT, 1096 E. Meadow Circle, Palo Alto, Calif. 94304.

INFORMATION PROCESSING TECHNIQUES CORP.
Tracer

Information Processing Techniques Corp. (IPT) has introduced a C language development tool for Data General Corp.'s Nova, Eclipse and MV machines running under DG's Rdos, AOS and AOS/VS; for IPT's Eclix operating system; and for Digital Equipment Corp. VAX series computers running under DEC's VMS or Ultrix-32.

According to an IPT spokesman, Tracer is a C source analysis/debugging tool that operates in three modes. Tracer's source analysis mode highlights nonportable or wasteful code segments, variable-type usage conflicts and unused variables and functions.

The package's runtime analysis mode indicates the names of new variables, the names and values of functions and arguments upon entry and the name of the caller, labels of statements and execution of IF/ELSE, DO and CASE statements. The product's interactive mode allows a programmer to set break points and run through a program interactively.

A one-time license fee for Tracer is $3,950.

IPT, 1096 E. Meadow Circle, Palo Alto, Calif. 94304.

LATTICE, INC.
IAPX86 compiler for VAX/VMS

Lattice, Inc. has announced that its IAPX86 compiler can now be used as a cross-compiler for Digital Equipment Corp. VAX-11 superminicomputers running under DEC's VMS operating system.

The Lattice VAX/VMS cross-compiler is said to have the same functions and generate the same code as native compilers. It reportedly corresponds to Microsoft Corp. MS-DOS V.2.14 compilers and can generate code for the Intel Corp. 80186 chip, a Lattice spokesman said.

The cross-compiler is available on nine-track magnetic tape in the VMS backup format. It is said to contain a hierarchical directory that mirrors the native compiler structure. Directories for the memory models contain runtime libraries and start-up routine object modules, the spokesman said. An object module disassembler and a function-extract utility are included. The cross-compiler is priced at $3,350.

Lattice, P.O. Box 3072, Glen Ellyn, Ill. 60138.

LISP MACHINE, INC.
Rtime

Lisp Machine, Inc. has introduced a software package for its Lambda family of Lisp processors that is designed to enable Lisp programs or expert systems to handle real-time processes.

According to a spokesman, the Rtime package uses the parallel processing capabilities of the Lambda/Plus series of Lisp machines.

The product reportedly allows the Motorola Corp. MC68010 microprocessor of the Lambda/Plus to monitor and screen incoming information on a real-time basis, and it allows the Lisp processor to concentrate on expert

Continued on page 44

. . . And the one with the most innovation yet to come.

SOFTWARE & SERVICES

Continued from page 43

systems decisions.

Written in C, Rtime operates in parallel with the Lisp processor and communicates with it via a Lisp-based serial interface or by maintaining data values in arrays in shared memory, the spokesman said. The product handles tasks such as data acquisition, calculations, process-related algorithms and low-level inferences.

Rtime is priced at $20,000.

Lisp Machine, 6033 W. Century Blvd., Los Angeles, Calif. 90045.

PRODUCTIVITY AIDS

FOUR-PHASE SYSTEMS, INC.
Maestro+

Four-Phase Systems, Inc. has announced that Softlab Systems, Inc.'s Maestro+, a project management package for use with the Maestro software development computer system from Softlab Systems, Inc. of Munich, Germany, is now available for the Four-Phase Series 4000 running under Four-Phase's MFE/IV operating system.

According to a spokesman, Maestro+ consists of two programs: a project library service for administering development material and for supporting project standards, methodologies and information flow; and a project management service for task distribution, cost' control, automated entry, generation and evaluation of reports, tables, charts and trends.

Maestro+ costs $17,000.

Four-Phase Systems, 10700 N. DeAnza Blvd., Cupertino, Calif. 95014.

APPLICATION PACKAGES

JCA SOFTWARE, INC.
Express Delivery

JCA Software, Inc. has announced Express Delivery, a report distribution and tracking system that runs under IBM's MVS and MVS/XA operating systems.

According to a spokesman, the product enables data centers to implement banner page support and destination information required to distribute daily reports. Express Delivery allows a user to customize distribution information to suit individual data center requirements without requiring operating system modifications.

Report information is generated by production history, late production, user cross-reference and report cross-reference. Express Delivery is priced at $20,000.

JCA Software, Suite 224, 2182 Dupont Drive, Irvine, Calif. 92715.

S&H COMPUTER SYSTEMS, INC.
Indas-Graphics; Indas-Screen

S&H Computer Systems, Inc. has added a full-color, presentation-quality graphics facility and a screen-oriented data entry and editing facility to its Indas statistical analysis system for Digital Equipment Corp. VAX computers running under DEC's VMS operating system.

According to a spokesman, Indas-Graphics produces graphs and charts on a variety of plotters and display devices and provides 12 character fonts for labeling. The plotting facility produces scatter and line plots with optimal polynomial line fitting and confidence intervals.

Indas-Screen allows a nonprogrammer to generate a data entry screen for entering and editing data used with the Indas system, according to the vendor. The facility is said to support multipage screens and provide file maintenance facilities.

Initial license fees for Indas-Graphics range from $1,500 to $4,900. Indas-Screen is priced from $1,200 to $4,400, depending on machine size. Annual license renewal fees for all products are 50% of the initial license fee, according to the company.

S&H Computer Systems, 1027 17th Ave. S., Nashville, Tenn. 37212.

COMPUTER DATA CORP.
Project Cost

Computer Data Corp., has announced that its line of financial applications software now includes a Project Cost module for Hewlett-Packard Co.'s HP 3000 and Digital Equipment Corp.'s VAX series of computers.

Project Cost reportedly can be integrated with the company's Computer Data Information Systems software to provide financial,

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For Applications Development, today's RAMIS II combines 4th-generation flexibility with the efficiency of a compiled architecture to deliver the highest levels of productivity.

distribution and human resource software packages for manufacturers and distributors.

According to the company, Project Cost is an on-line, real-time, menu-driven application said to accommodate the posting and distribution of hours and labor expenses to the company's general ledger module of books, accounts and cost centers. Other features of the product include billing rate, cost code and task definition, as well as customer maintenance and start and completion date maintenance.

The Project Cost with the general ledger module costs $20,000. The general ledger module alone costs $15,000.

Computer Data, 31344 Via Colinas, Westlake Village, Calif. 91362.

MOBIUS MANAGEMENT SYSTEMS, INC.
Infopac 2.0

Mobius Management Systems, Inc. has released Version 2.0 of its output management software system for IBM's DOS/VSE and MVS operating systems.

Designed for nontechnical personnel, Infopac 2.0 is used in distributing computer-generated reports. According to the company, it automatically groups each end user's pages from multiple reports into addressed and indexed packets. Report recipients can designate the number of reports or segments of reports they want to receive.

Infopac 2.0 is said to feature general and selective distribution schemes. The enhanced system also offers expanded default options and can handle reports of up to 255 columns in width, requiring one production job to execute. Optional add-on modules include Job Entry System and Power Spool interfaces, Laser Printer Interface, a Microfiche Module and a Remote Job Output Module, the company said.

Infopac Version 2.0 is priced at $12,500 for DOS and $15,000 for MVS.

Mobius Management Systems, 271 North Ave., New Rochelle, N.Y. 10801.

ISDOS, INC.
PSL/PSA; PSA-SA for AT&T Unix

Isdos, Inc. has announced that its software engineering tool, the Problem Statement Language/Problem Statement Analyzer (PSL/PSA), and its Problem Statement Analyzer-Support Environment for Structured Analysis (PSA-SA) are now available for use with Apollo Computer, Inc. and Pixel Computer, Inc. workstations and Digital Equipment Corp.'s VAX series, Hewlett-Packard Co.'s HP 9000 and Gould, Inc.'s 3287 minicomputers running under AT&T's Unix operating system.

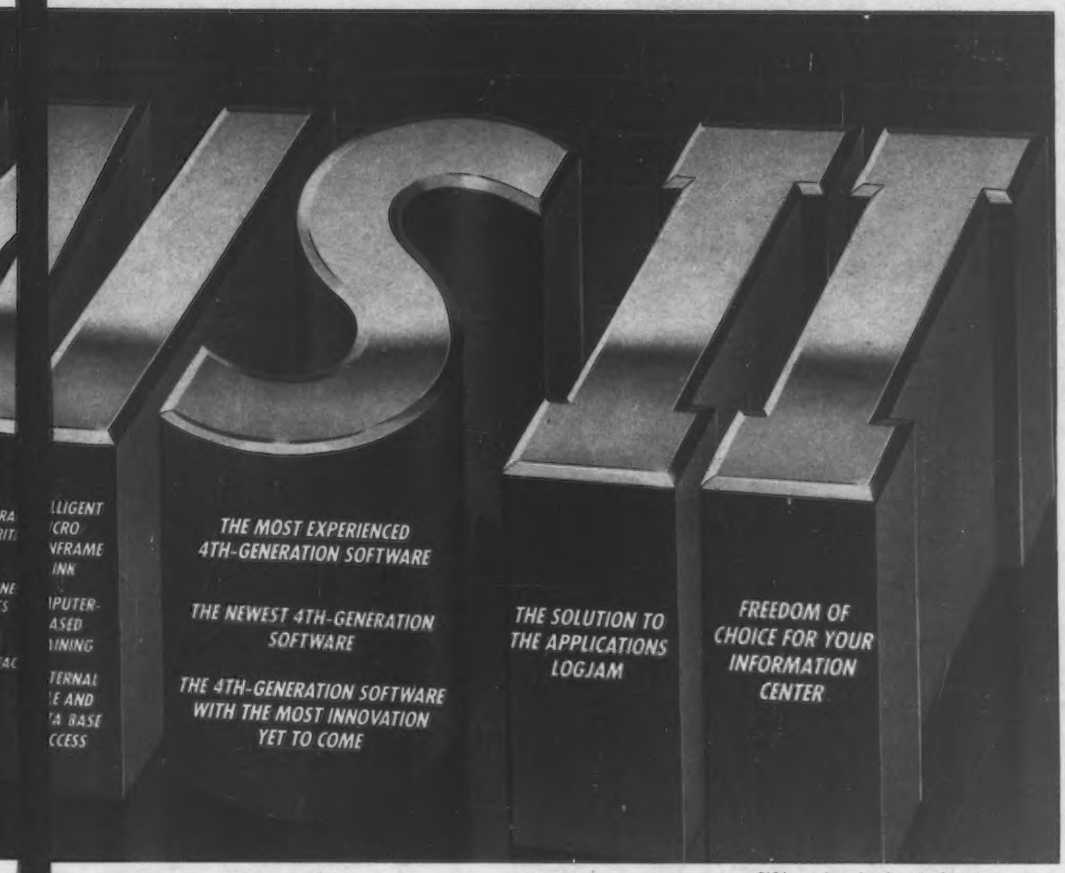
According to a vendor spokesman, PSL/PSA is a computer-aided tool that automates the development of requirements and the analysis and design of an information system. It reportedly allows developers to describe an information system, provides quality assurance through completeness and consistency analysis, allows "what-if" analysis and automates the production of deliverable system documentation.

The menu-driven PSA-SA environment works in conjunction with PSL/PSA to automate the analysis process in structured methodologies. It includes predefined quality assurance analyses appropriate to the methodology and generates a deliverable, structured specification document as a by-product, the vendor said.

Superminicomputer and mainframe versions of PSL/PSA are priced at $45,000, with an additional $3,000 to add the PSA-SA environment. The workstation versions of PSL/PSA range from $15,000 to $22,500, with an additional $1,500 for PSA-SA.

Isdos, P.O. Box 4179, 325 E. Eisenhower Pkwy., Ann Arbor, Mich. 48106.

See **AIDS** page 50



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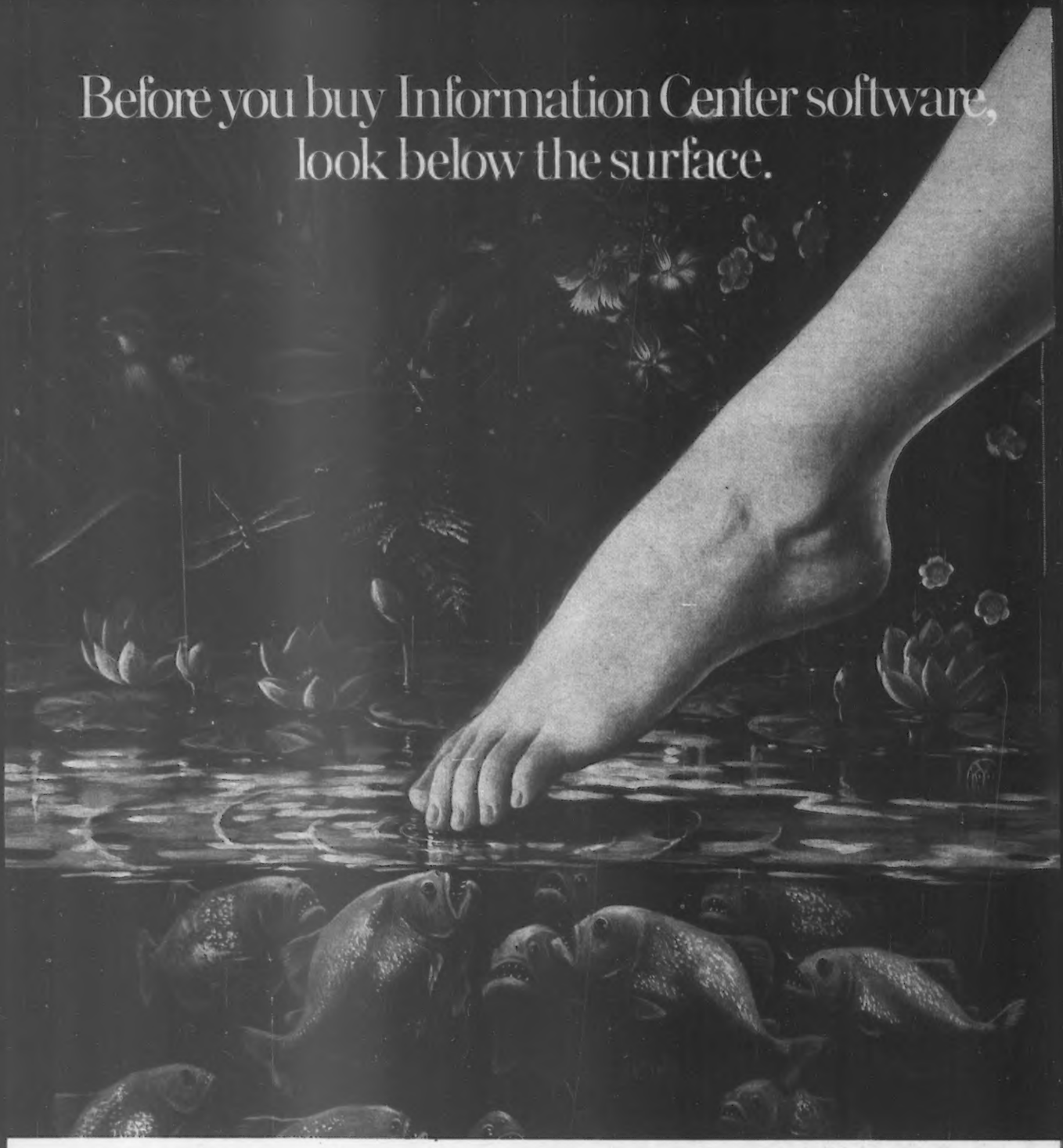

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BANK from page 37

department with additional job submissions and management of overall processing. And if compresses were not scheduled, programmers would likely run out of space, Schaefer said. TSO would stop, and the 70 to 90 programmers using it at Connecticut National would be idle.

The bank uses two IBM 32M-byte 3081 processors running under the MVS/XA operating system: one for production processing and one for program development.

Since installing PDSMAN, Connecticut National has begun to rely on the Dynamic Build Directory List (BLDL) facility in the system to create a list of all programs and their addresses in storage. Program requests cause the storage device to seek out addresses each time they are requested. "Simply using BLDL for high-traffic load libraries creates enormous amounts of Dasd contention and very high overhead," Schaefer explained. "PDSMAN remembers the addresses of the most-used programs. It records them the first time the program is loaded. The next time the program is loaded, PDSMAN remembers and goes right to the program without consulting the directory."

Accessing PDSMAN statistics from a terminal at his desk one morning, Schaefer reported that approximately 35,000 program requests had been processed from the system link list so far that day. Of those, 31,000 were fulfilled by PDSMAN; 3,500 required an actual library search. Thus, more than 90% of requested programs were found faster with virtually no excessive overhead by the PDSMAN BLDL, he said.

Except for some minor contact with Goal Systems developers to smooth out PDSMAN interfaces with MVS/XA, Connecticut National has had little need to use the vendor's technical support, Schaefer said.

'System works with us'

"The system works with us to pinpoint problem areas," he explained. "When something goes wrong, we can just shut PDSMAN off until we find the problem. If it's within PDSMAN, we find out right away. Usually it's elsewhere. We isolate the problem, fix it and then turn PDSMAN back on. Since PDSMAN requires no initial program load to activate, we can turn it on and off at will.

"We have bought Dasd hardware in the last 18 months to handle additional capacity from businesses that have joined the bank, but we haven't added PDS," Schaefer said. "Today, library compresses that were formerly required on a daily basis are done weekly. The ones that were weekly are now monthly.

Conversion to PDS

"Our technical people are talking about converting entirely from source library software files to PDS. Right now, we have one large source library for 110 programmers. . . . The proposal from my technical staff is to break up the huge source library into multiple PDS.

"We could maintain far better control of programs and let PDSMAN worry about the storage. PDSMAN maintains its control at the programmer level, never allowing a program to be filed without creating a backup for its archives."

Has the bank's data processing division made its grade? Schaefer reports yes, more often than not. Space is rarely unavailable to users, and since TSO is no longer overburdened, response time remains acceptable.

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12:00 - 1:00	Lunch
1:00 - 3:30	Breaking the Applications Logjam

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'Breaking The Applications Logjam.' If you are responsible for planning, implementing or maintaining applications, this seminar is designed for you. It will show you how to break free of the applications logjam by cutting development time and building *better* systems.

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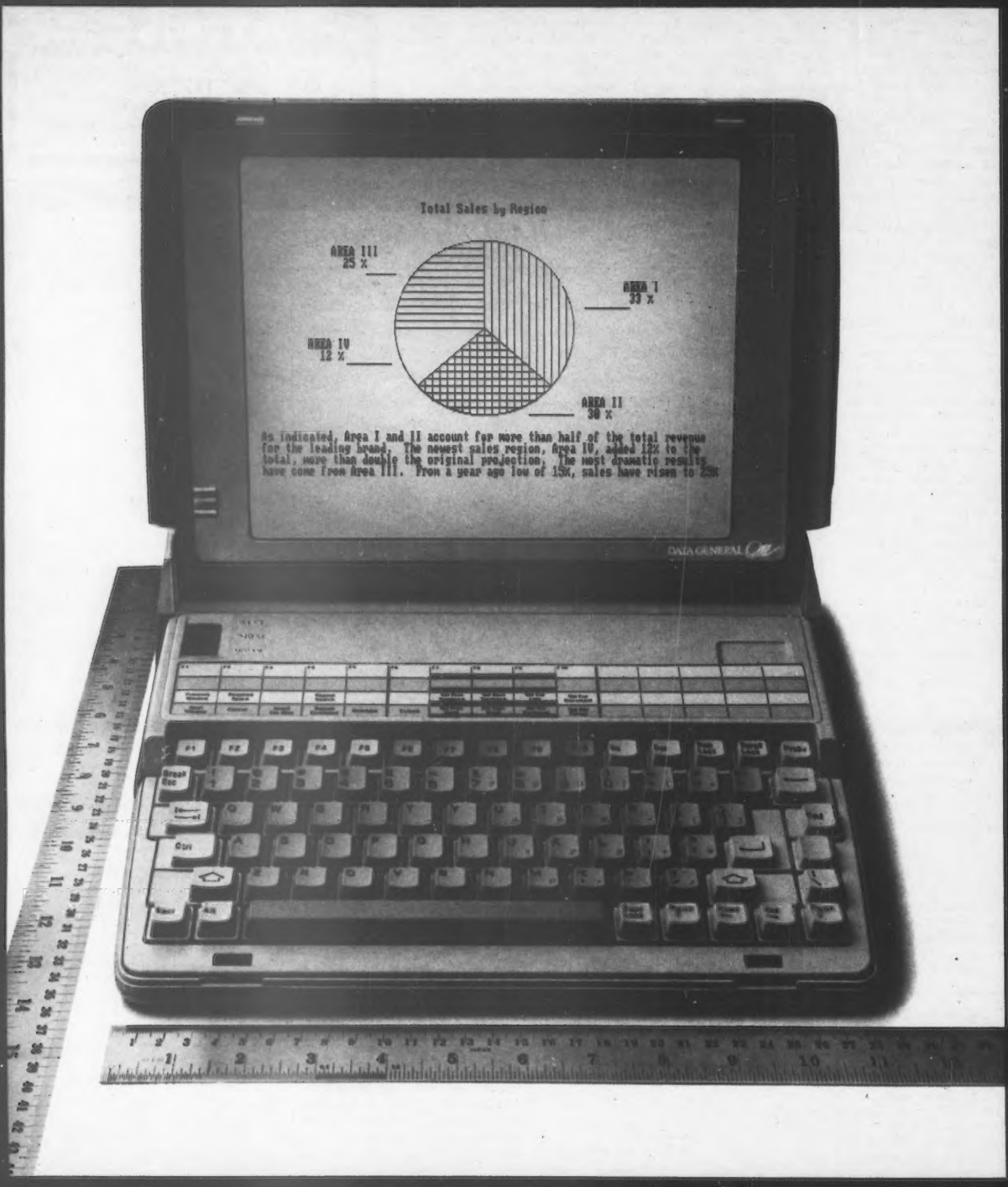
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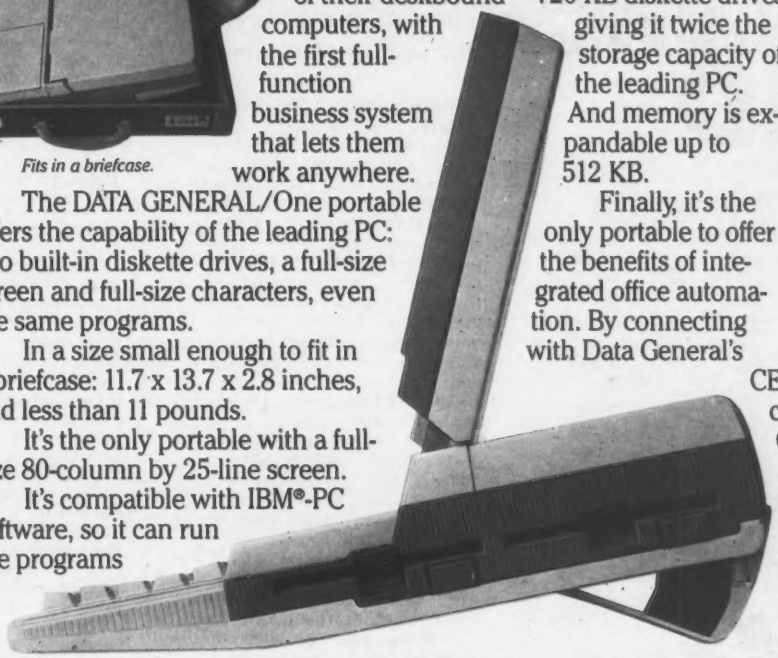

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KURZWEIL COMPUTER PRODUCTS, INC.

Interfaces for Kurzweil 4000 Scanning System

Kurzweil Computer Products, Inc. has introduced custom interfaces for its Kurzweil 4000 intelligent scanning system to the IBM Personal Computer Displaywrite and the Wang Laboratories, Inc. VS series.

According to the company, the interfaces insert format codes specific to PC Displaywrite and Wang's Word Processing Software (WPS) into scanned text during the communication process from the Kurzweil 4000.

The PC Displaywrite interface inserts codes for PC Displaywrite products. It is said to communicate synchronously in the IBM Revisable Form-Text Document Content Architecture.

The Wang VS series interface reportedly communicates synchronously in Wang's WPS mode and is said to insert code to the WPS document format.

The interfaces are available for $3,500 each.

Kurzweil Computer Products, 185 Albany St., Cambridge, Mass. 02139.

COMPUTER SOLUTIONS, INC.

Growthpower Release 4.0

Computer Solutions, Inc. has announced Release 4.0 of its Growthpower package, an integrated manufacturing, financial and marketing software system for assembly manufacturers.

Reportedly, the package was designed for the Hewlett-Packard Co. HP 3000 minicomputer running under HP's MPE operating system and interfaces with the IBM Personal Computer and the HP 150 micro. More than 200 enhancements are said to be included in the modules of Release 4.0. An on-line, horizontal, vertical and action-planning MRP inquiry function suggests quantities of parts to be ordered so that production schedules are met on time. Another improvement in the MRP module allows users to get daily status reports, both hard copy and on-line, that reflect up-to-date changes in inventory quantities and orders.

The price of Growthpower 4.0 ranges from $30,000 to $60,000.

Computer Solutions, One Burlington Woods, Burlington, Mass. 01803.

BEDFORD RESEARCH

I*S*P 1.2

Bedford Research has announced the release of Version 1.2 of Interactive Signal Processor (I*S*P), a research and design software system for Digital Equipment Corp. VAX-11 and PDP-11 minicomputers.

Multichannel processing, enhanced graphics, signal editing, audit trail, coherence analysis and structured programming features have been added to the product, a spokesman said. The product is priced at $9,500.

Bedford Research, 4 De Angelo Drive, Bedford, Mass. 01730.

LINK from page 37

ry files to be moved to or from host VM disks to virtual disks.

Through the use of virtual disks and VM facilities, users can access data that resides on a host VM system, share data among other Personal Computer users running VM Bond, send files to other users connected to the same VM host, store data in a VM host system and provide for the backup of data through VM host backup procedures.

The representative said the link includes a command interpreter language extension similar to the Rexx/370 command interpreter available with VM/SP Release 3 to provide a common control language between the two environments.

Rexx/PC operates completely on the micro and can control the sequence of commands and program execution based on real-time interpretation of the environment.

The VM Bond portion of the micro-mainframe link is available for a one-time charge of $125. A single license for the PC Bond portion supports all VM Bond users on the same machine. It is available for a one-time charge of $2,000 and a monthly license charge of $100.

For more information, the National Accounts Division of IBM is located at 1133 Westchester Ave., White Plains, N.Y. 10604.

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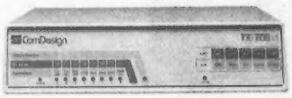

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IN DEPTH

Thou Shalt Not Dupe

So says a vendor of software — is anyone listening?

By Marv Goldschmitt

For certain leading products, the ratio of illegal copies in use to legal copies licensed is greater than one to one, according to a recent study. Virtually all of these packages came with some sort of diskette-based copy protection and written prohibitions against copying.

The microcomputer software industry has entered into an arms race with consumers in an attempt to stem the tide of illegal copying. From a business standpoint, this escalating cold war is tremendously counterproductive, frustrating legitimate users of micro software products and generating ill will toward the publishers.

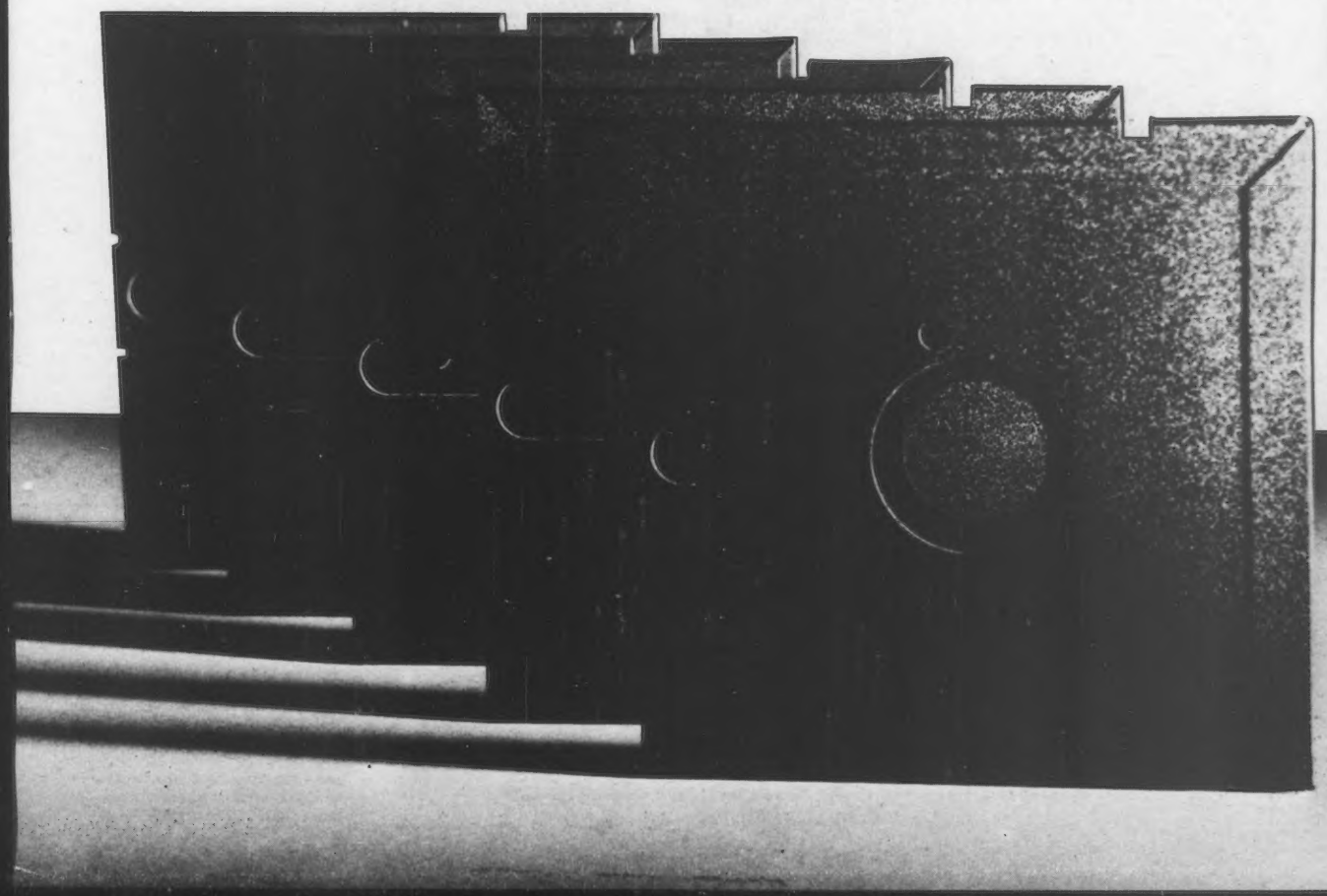
The roots of the problem are certainly complex. First, in the last 25 years, society has become desensitized to the rights of the developers of intellectual property. Paper copy machines began the process by providing people with the opportunity to make quick and inexpensive exact reproductions of others' copyrighted printed work.

High-quality consumer audio recording equipment has certainly hurt the record and prerecorded tape industries. The advent of the videocassette recorder and videodisk industries has allowed people to make unauthorized copies of motion pictures.

Finally, the very technology and proliferation of microcomputers, which spurred the micro software industry's meteoric rise, are also enabling users to make thousands, if not millions, of illegal copies of software.

In many respects, the copying of micro software is much more insidious than the other instances. The cost differential between buying a legitimate copy or making an illegal copy of a written work, movie for personal use or record is almost incidental. After all, who is going to stand over a copy machine and run off *War and Peace?* The cost differential between buying *Thriller* in the store and copying a friend's record on a blank tape is less than $10.

The cost of renting a movie for a video cassette recorder may be a few



dollars a day — less than purchasing a blank tape.

Yet the price difference between buying a legitimate copy of an integrated software product or making an illegal copy on a $5 blank disk is frequently hundreds of dollars. In addition, the software is a tool that is normally used repetitively and thus has a value that increases. *Gone With the Wind*, with the exception of a few movie buffs, loses it value after being viewed by the same person a few times.

Second, the infant micro software industry is not as well positioned as the more established record, motion picture and print publishers to withstand substantial revenue losses to piracy.

Third, unlike other industries affected by illegal copying, software publishers are called upon for significant after-sale support. With the tremendous number of illegal copies in use, this demand places a greater cost and strain on the software publishers' support system without compensating revenues.

Finally, the micro software industry is arguably stuck with the largest copying problem in any industry. A recent Future Computing, Inc. study indicates that for a number of leading business computer software products, the ratio of illegal copies in use to legal copies licensed is greater than 1:1. For every legitimate copy purchased, there is at least one illegal copy in use. Interestingly, virtually all the products studied had some sort of diskette-based copy protection as well as written prohibitions against copying included in the package.

It is obvious that each illegal copy in use would not translate into a sale. However, if only one in four of the illegal copies had been purchased instead, the micro software industry's revenues would increase more than 25% annually, or an additional $300 million during 1984.

What can the industry do?

Diskette-based protection schemes have not been very effective in stopping software piracy. It is equally clear that diskette-based protection has created many difficulties for legitimate users of software products. Many diskette-based protection implementations require a disk to remain in the drive while the product is running, limiting the use of the computer system to that single product. Copy protection also makes it difficult for users to make what seem to be reasonable backup copies for archival and security purposes.

While the basic technology employed for disk protection has remained essentially the same over the last five years, other microcomputer-related technologies have continued to move ahead. As a result, users find it difficult to run protected products on hard disks and in multiuser environments, such as local-area networks. People have resorted to a variety of patches, bit copiers and snapshot programs that are available commercially and on dial-up bulletin boards to circumvent software protection so they can use the software on a local-area network.

Many users are aware that they are breaking U.S. copyright law when they make copies. Illegal disks often proliferate quietly through an organization or user network as one person makes a copy for a co-worker or friend, who makes an additional copy for someone else. While these activities seem harmless from many users' points of view, they are not only creating serious problems for the micro software industry but can create serious legal problems for organizations that allow copying.

Any solution to the software piracy problem must satisfy the customer so that the publishers can remain in business. Some illegal software copying results from user dissatisfaction with roadblocks for effective use put in place to protect software from illegal copying. Software vendors must make the business decision to alleviate the problems that motivate users to copy software while creating public awareness of the copying problem. At the same time, software publishers must protect their legitimate rights to fair compensation.

Software publishers must find a way to stop the arms race with end users. All software protection thus far can be broken by software modification. Unfortunately, current diskette-based protection may have done as much to encourage software piracy as to discourage it. The need for new technologies of software use authorization is glaringly obvious.

Why should DP care?

Whereas virtually all data processing departments have grown up with license agreements and contracts with mainframe and minicomputer software products companies, most end users have very little idea of the rights or responsibilities of software use. In fact, many never see the license agreement and are simply given the disks and documentation.

It is therefore incumbent upon data processing managers to inform end users of the potential consequences of illegal software copying. As more software is reproduced unlawfully, software developers are being compelled to sue to protect their rights. Most companies that have been caught have settled out of court to avoid embarrassment and unfavorable publicity. Under the U.S. Copyright Law, civil damages for illegal software copying can be $50,000 or more, depending on the amount of loss to the publisher.

The Association of Data Processing Service Organizations (Adapso), the trade association representing the computer software and services industry, has begun a public awareness campaign to deal with this issue. The organization, representing more than 750 companies in the

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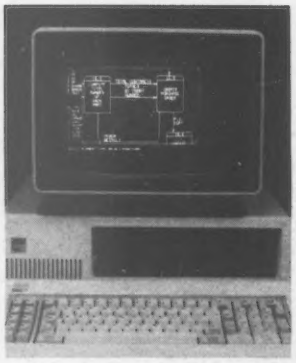

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business, developed the brochure titled "Thou Shalt Not Dupe," which deals with the issues of software piracy and "softlifting."

The brochure deflates the myths of software piracy, explains the U.S. Copyright Law and its penalties, tells why users should take steps to curb software piracy in their organizations and urges all companies to adopt a policy statement against software piracy, circulate it to all end users in the organization for their signature and enforce it.

The following language taken from the brochure represents a guide for the development of such a policy statement:

I recognize that:

1. (Company, organization) licenses the use of its computer software from a variety of outside companies. (Company, organization) does not own this software or its related documentation and, unless authorized by the software developer, does not have the right to reproduce it.

2. With regard to use on local-area networks or on multiple machines, (company, organization) employees shall use the software only in accordance with the license agreement.

3. (Company, organization) employees learning of any misuse of software or related documentation within the company shall notify their department manager or (company's, organization's) legal counsel.

4. (Company, organization) employees caught making, acquiring or using unauthorized copies of computer software will be disciplined as appropriate under the circumstances.

5. According to the U.S. Copyright Law, illegal reproduction of software can be subject to civil damages of $50,000 or more and criminal penalties including fines and imprisonment.

I am aware of the software protection policies of (company, organization).

Employee signature

Date

Adapso will circulate more than 60,000 of these brochures to end users, DP professionals, corporate legal counsel, superintendents of schools, college presidents and U.S. corporate presidents, urging them to adopt a software protection policy statement, circulate it to all employees and inform Adapso of their decision to adopt a policy.

Because of the lack of understanding and involvement of corporate presidents and most end users in the software licensing process, the association is urging data processing professionals to bring this issue to the attention of company presidents to encourage them to adopt such policies.

If users clean their own house, not only will the organization be safeguarded from potentially costly litigation, but also the health of the software industry will improve so that better products and support can be delivered to end users. Free copies of the "Thou Shalt Not Dupe" brochure are available by writing to: Thou Shalt Not Dupe, Adapso, Suite 300, 1300 N. 17th St., Arlington, Va. 22209.

Adapso's Software Protection Committee is working to develop a proposed set of standards for software authorization systems so that the user and the industry will have a consistent set of guidelines for any hardware-based solution developed in the future. In order to have a formalized standards process, Adapso must make the user community, software protection vendors, hardware manufacturers and software developers aware of the process, as well as

If users clean their own house, not only will the organization be safeguarded from potentially costly litigation, but also the health of the software industry will improve so that better products and support can be delivered.

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provide the opportunity for input and comment. As a result, the committee has developed a software authorization overview paper that covers the preliminary work of the committee. Anyone interested in receiving a copy of the paper or serving on the technical review subcommittee should write to the Adapso office.

The remainder of this article is excerpted from the committee's paper.

Statement of goals. The goal of a technical solution to the problem of unauthorized software use should address the needs of both users and software vendors. At this time, we can identify six basic goals for a successful technical solution:

1. Provide a new and significant level of protection.
2. Provide tangible benefits to users.
3. Be inexpensive.
4. Be convenient for the user and provide transparent operation.
5. Be uniformly and generally implemented (to the extent possible).
6. Allow voluntary and flexible implementation by software vendors.

Hardware-based protection. Hardware-based protection attempts to separate authorization to use software from the software itself. By isolating authorization within a hardware device, the vendor increases the level of technical sophistication required to break the protection scheme.

At least two microcomputer software vendors have implemented hardware-based protection devices: BPI Systems, Inc. and Sensor-Based Systems. In 1980, BPI required a device to allow operation of its accounting package on the Apple Computer, Inc. Apple II Plus. To use the software, the user had to open the computer and place the device in the game paddle port of the Apple.

While this scheme was apparently successful in protecting BPI's software, it represented a major inconvenience for the user. Because the device was not transparent, it monopolized the computer's game paddle port. This meant that the user had to remove and replace the device often to gain use of this port. The device was fragile, and pins bent after several insertions. Realizing the difficulties with this system, BPI discontinued its use early in 1982 and eventually adopted a diskette-based protection scheme.

Trial and error

Sensor-Based Systems has used hardware-based protection with its Metafile products since 1979. Initially, Metafile required installation of a programmable read-only memory (Prom) chip in a Vector Graphic, Inc. computer. The system worked well for protection, but as with the BPI scheme, users found it inconvenient to install the Prom.

The initial implementation of Metafile for the IBM Personal Computer required a Zilog, Inc. Z80 microprocessor to operate. Sensor-Based Systems bundled Metafile and the Prom with Xedex Corp.'s Baby Blue Card to provide both the needed microprocessor and the protection. This method, while effective, lacked portability.

In August 1982, Sensor-Based Systems released an Intel Corp. 8086 version of Metafile for the Personal Computer. This release incorporated a specially designed hardware-based protection device. The device attached to the RS-232 port. This method was well received by users and is currently in its fourth generation of refinement.

While Sensor-Based Systems' experience suggests a direction for hardware-based software authorization, it does not meet the needs of all users and vendors.

Features of a software authorization system to meet our goals.

1. Provides a new, significant level of protection.

No method can provide complete protection against individuals who are determined to defeat it. The experience of BPI and Sensor-Based Systems shows that a properly designed hardware device can significantly raise the cost of breaking the protection scheme.

The eventual proposal will specify standards for hardware-based software authorization systems that generally have the following features:

- A level of technical sophistication that raises the level of difficulty required to defeat the system while it decreases the motivation.
- An environment that

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facilitates vendor implementation of various authorization methods with increased security and decreased vulnerability.

■ A software/hardware interface that allows periodic testing for authorization to defeat patches and snapshot programs and to prevent removal of the system and simultaneously run software on a second computer.

2. Provides tangible benefits for the user.

Hardware-based software authorization is a radical departure from diskette-based protection. Implementation of this approach separates the software product from authorization to use the product and offers potential benefits to the user:

■ Allows reasonable and legal copying for archival and security purposes because copies can only be used with a specific hardware key.

■ Enables vendors to provide customers with software for trial use before they buy and makes legitimate lending libraries possible.

■ Allows software to run directly from a hard disk because diskette-based authorization is no longer required.

■ Allows (when appropriately licensed) software to be run from a local-area network. Authorization takes place at the individual workstations.

■ Provides a way for large-scale users to control personal computer operations within their organizations by controlling devices rather than diskettes.

3. Is inexpensive.

Making the systems inexpensive to implement will allow acceptance by both vendors and users. This goal should be accomplished by keeping the technical standards as simple and easy to implement as possible. In addition, maintaining the standards in the public domain will encourage entry of third-party vendors to help bring market forces to bear on the cost of implementation.

4. Is convenient for the user and provides transparent operation.

For the user, a major shortcoming of current software protection schemes is their inconvenience. To be attractive to both software vendors and users, an authorization system must be easy to install and use and must not interfere with the normal operation of the computer. The eventual standards proposal will therefore envision devices that:

■ Are effectively engineered to be small, lightweight and durable, allowing users to move the device easily from one machine to another.

■ Provide a standard configuration with removable hardware "keys."

■ Use a standard RS-232 port for easy installation on most computers.

■ Allow pass-through connection and provide transparency at a speed of at least 19.2K bit/sec so that the RS-232 port can be used for other devices.

■ Allow for simultaneous use of multiple software products.

5. Likely to be uniformly and generally implemented.

To avoid confusion in the marketplace, the general features of software authorization systems should be as standardized as possible. This standardization will provide consistency for software vendors and users so that both will be able to rely on a single type of system.

In addition, the system should be machine-independent and allow implementation for current hardware and operating systems and adapt to future technologies. The standards should therefore be established so that:

■ Physical specifications and protocols are maintained in the public domain to provide adequate information and equal access for all concerned parties.

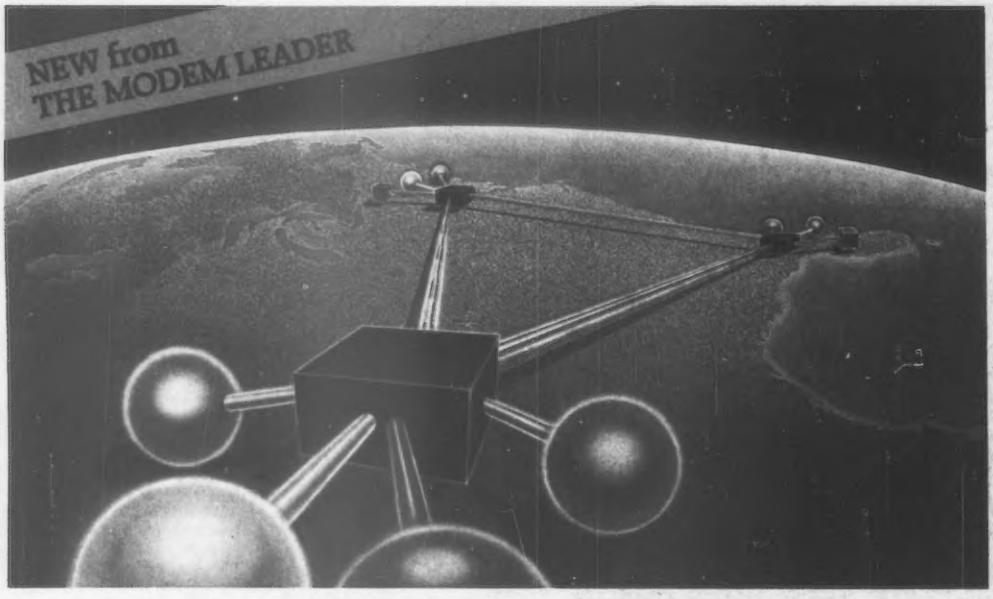
■ Opportunities are created for third parties to design and develop specific systems and authorization methods.

■ Communications are allowed on either status or data lines to enable implementation for single-user, multiuser and multitasking systems.

■ Device drivers are allowed to enable implementation with operating systems that do not provide direct addressing of the status and data lines.

6. Allows voluntary and flexible implementation by software vendors.

All proposed standards must allow software vendors to use the system as they see fit and should not exclude any other form of software authorization. The proposed



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standards should therefore:

- Provide a facility for implementing vendor-designed authorization schemes rather than prescribing a specific method.
- Allow vendors to continue using diskette-based protection or not protect software at all.
- Allow for a variety of levels of protection, from simple serial number checking to sophisticated encryption algorithms.

The proposed standards may also provide additional benefits for users and after-market potential for entrepreneurs. A number of custom and generic options appear possible at this time. These include:

- Encryption for securing sensitive data.
- Use of a software authorization system as a terminal identifier to allow hierarchical access restriction on networks and corporate mainframes.
- Bundling the software authorization system with other peripherals such as modems or print spoolers.

Adapso believes that the proposed standards will open up other possibilities for after-market applications. These will be limited only by the creativity of the innovative third-party hardware and software vendors.

Implementation issues

Illegal software copying is an industrywide problem. Therefore, Adapso's Software Protection Committee recommends development of a set of standards for software authorization systems. The standardization process is described in the box above. The proposed standards will not specify a particular device (key ring) or authorization method. Rather, they will describe the physical connections and protocols for software authorization systems generally. Specific implementation will be left to software vendors and third-party hardware vendors, which will provide flexibility and allow market forces to reduce the costs of implementation.

Implementation of a software authorization system will proceed along three avenues:

- Development of an Adapso standards process.
- Introduction to the marketplace.
- Specific implementations by software vendors.

In addition, a method must be developed for identifying and dealing with potential problems that users may encounter in using the system.

Implementation of a software authorization system can only succeed if the economic impact on both software vendors and users is minimal. The combination of low cost and potential benefits should facilitate its introduction into the marketplace. In

How the process will work

The standardization process suggested by Adapso includes three phases: proposal development; proposal presentation, review and comment; and action on the proposal by the Adapso board of directors.

Proposal development formally begins with the publication of this document. The aims of this phase are to open the discussion to all interested parties and to assess the overall technical feasibility of the proposed solution.

During this phase, the committee will develop monthly reports and technical papers that describe work to date and progress toward developing proposed standards. These documents will be available to all interested parties to allow them to respond with comments and to begin thinking about possible implementation issues.

As the proposal of standards is being developed, Adapso will also do the following:

- Actively recruit interested and potentially interested parties.
- Inform the Department of Justice of its intent to develop a set of standards and request a business review letter.
- Determine voting requirements and procedures for the proposed standard.

At the end of the proposal development phase, Adapso will distribute the proposed standard, supporting materials and ballots to all interested parties for review and comment.

The public review period will last for a minimum of three months. One month before the end of the review period, Adapso will contact reviewers who have not yet responded by returning their ballots and comments. Adapso will seriously consider and respond in writing to all substantive reviewer comments. Any substantive changes in the proposed standards will be subject to additional review and balloting.

At the end of the review period, Adapso will count the ballots and review comments. It will respond to all substantive comments and consider incorporating them into the set of standards. The final, revised standards proposal will then be presented to the Adapso board of directors for adoption.

Introduction of a software authorization system to the marketplace will require acceptance by vendors and users. In addition, implementation will require an independent body to manage general issues, such as serial numbers and standards maintenance.

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addition, increased public awareness of the negative economic impact of software theft on software vendors and users will aid in this effort.

Software clearinghouse

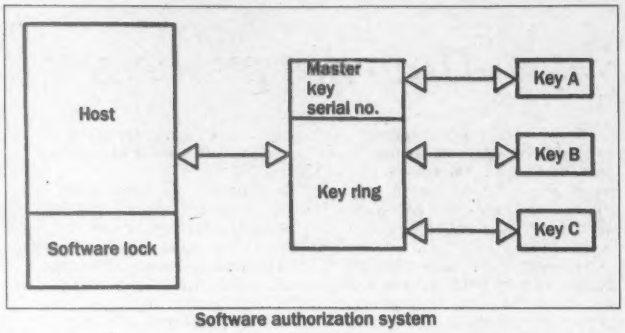
Implementation will require an independent body with administrative responsibilities. While the specific structure of the body remains to be worked out, one possible model is a clearinghouse similar to that developed for administering Universal Product Codes.

A clearinghouse would be responsible for the following:

- Controlling and distributing hardware and software serial numbers to vendors. The hardware vendor serial number will allow vendors to create unique identifiers for each key ring. The software vendor serial number will allow vendors to create an address to facilitate software/hardware communications.
- Certifying that key rings comply with the standard. This will ensure that key rings manufactured by different vendors will be compatible.
- Maintaining the standards in the public domain. The clearinghouse will evaluate and incorporate any revisions to the standards that result from technological advances.

The standards will provide a facility for implementing software authorization rather than a specific method. Software vendors will be able to design their own implementations within a wide range of possibilities, depending on their specific needs. Some possibilities include:

- Using the unique serial number provided with the key ring with no hardware additions by the software vendor.
- Using a third-party-designed hardware device (key).
- Using a specific vendor-designed hardware device (key).



Software authorization system

Potential user problems

At this time, several potential user problems seem possible. These include failure of the hardware device, loss of the hardware device and loss of data because of data line collisions.

Vendors should consider replacing broken or lost devices through their established dealer networks and direct-support channels. Because devices will have unique identification numbers, it is also possible that market forces will generate independent replacement services. These could be similar to services that handle credit card replacement.

If vendors choose implementations that rely on data line communications, loss of data may occur in multitasking environments if incoming data arrives at the same moment the program is interrogating the key ring. If vendors do choose this option, they should warn users of the possible implications.

This section contains information that represents work in progress. It is neither complete nor stable. It is a snapshot of the current state of the project. As comments come in and research and development proceeds, the technical information will continue to evolve and become more complete.

This technical information is presented in the context of a model system called the Software Authorization System. This model system should not be construed as a proposed standard but as merely a vehicle that aids in discussing the difficult concepts associated with hardware-based software authorization systems.

The Software Authorization System has three parts — one part software and two parts hardware. The software part of the system is analogous to a lock. The software lock is typically a program module embedded in the code of the software product that prevents the program from executing without authorization. The first of the hardware parts is analogous to a key ring and the second to a key.

The three parts of the system (lock, key ring and key) work in conjunction with one another to authorize the use of a software product that has been protected. The software lock prevents unauthorized use of a software product, the key ring holds the user's set of keys and the key unlocks the product and authorizes use (see figure).

The lock is typically a program module (or modules) that checks the key ring serial number and/or the key that authorizes use of the product. In the latter case, the program module can have a dialogue with the key if the key is present. This dialogue would consist of an algorithm (of the software vendor's design) that interrogates the product's unique key. If the key supplies the correct answer, the module unlocks the software product and authorizes its use.

The key ring is a hardware device that can vary in size. It holds a user's collection of keys to various software products. The key ring is the

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traffic manager for the communications that take place between the host and individual keys.

The key ring connects to a computer's RS-232 or equivalent port via a cable that has a pass-through connector. The pass-through connector allows another device (for example, a printer or modem) to be connected to the computer through it.

The key ring is transparent to the communications between the computer and an attached peripheral device and avoids the need for a dedicated port for the Software Authorization System. The degree of transparency varies depending upon the communications method used. When a software product (on the host) is looking for authorization, it communicates with the key ring (and ultimately the key).

The key is a small device (generally about the size of an office key, although the size may vary) that plugs into the key ring. Software vendors can design custom keys for their products or use off-the-shelf and semicustom versions that are expected to be produced by third-party vendors. Using current technology, each key would contain (at a minimum) a single-chip microcomputer to control communications with the key ring. The physical design of the key enables easy insertion, uses minimal space and guarantees the proper orientation of the key. There are two types of keys: a master key and standard software key.

The master key comes with the key ring and contains a unique serial number that is assigned by a clearinghouse. The master key may be polarized differently from standard software keys. Some software vendors will use the unique serial number on the master key to marry a copy of the software product with a specific key ring. In the event the key ring fails, the master key, with the identifying serial number, can be moved to a new key ring.

Standard software keys can provide for several levels of authorization, depending upon the inclination and needs of a particular software vendor. At a minimum, a standard key must contain a unique software vendor ID and a product ID, which would serve as a "telephone number" for the software product to call its specific key. To avoid duplication and confusion in the marketplace, the unique software vendor ID would also be assigned by the clearinghouse. The product ID is chosen by the software vendor.

> ***Some software vendors will use the unique serial number on the master key to marry a copy of the software product with a specific key ring. In the event the key ring fails, the master key, with the identifying serial number, can be moved to a new key ring.***

In an elementary authorization scheme, the module in the software product would call the key ring to see if the appropriate key is present and authorize use of the product on this basis alone. A more sophisticated scheme would do this and then have a two-way conversation with the key in which both the question the software lock is asking and the answer the key is providing are based upon a complex algorithm that is deeply buried in the product's code.

Some software keys could be more sophisticated than standard keys and, therefore, more expensive to produce. As an example, a more sophisticated key or engine key that incorporates a public key encryption processor might be produced by a third-party key manufacturer. A software vendor could use these third-party-produced engine keys in conjunction with its own standard key for its product's authorization scheme.

Two examples

The possible implementations of the Software Authorization System are extremely flexible and subject only to the imagination and ingenuity of software vendors, key ring and key manufacturers and third-party software protection (authorization) vendors. Depending on a software vendor's needs, implementations can range from simple to highly complex. In each case, the sophistication of the software lock and its interrogation of the key ring and key(s) play a major role in determining the degree of security of an authorization

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scheme. Possible implementations include the following:

- Uses key ring serial number only (no key involved).
  - Program self-installs the serial number.
  - A phone call to the vendor installs the serial number.
- Uses a key that contains the vendor ID only.
- Uses a key that both asks questions and provides answers (bidirectional communications).
- Uses two keys (standard and engine key) to provide authorization.

This appendix presents two sample implementations of the Software Authorization System. The two examples include a very simple (and inexpensive) implementation and a somewhat more complex implementation that uses a custom-designed key.

Consider the following relatively simple implementation of the Software Authorization Code.

ABC Software is a start-up software vendor that is introducing its first product. It is trying to keep its costs down but still wants to release its product with some degree of piracy protection.

To discourage anyone from making copies of its product prior to installation, ABC ships its product on a copy-protected disk. The installation process for the ABC product removes the disk protection and marries the user's particular copy of the software product with his key ring serial number. This combination of a unique copy of the program and a unique key ring serial number authorizes the user's copy (and subsequent backups) of the program to run only with his specific key ring.

Periodically, while the program is running, it queries the key ring to see if the serial number it remembered and the serial number on the key ring still match. If the numbers do not match, the program aborts. Although this particular scheme might be fairly trivial to find and patch, it affords the start-up software vendor some degree of piracy protection for very little cost.

Using a custom-designed key

The following briefly illustrates a more extensive implementation of the Software Authorization System.

Acme Software has produced several successful products and wants to implement a fairly sophisticated authorization scheme on its new product. For the new product, Acme would design (or have designed by a third-party key manufacturer) a software key with the following capabilities:

1. The ability to avoid redirection of more than one copy of the program to the key. This feature might use an incrementing number that is returned to the program each time the key is accessed. Each time the program is loaded, a base number is established between the lock and the key. During a particular session, each access of the key would increment the base number by one. If the number of the key returns does not match what the lock expects, the lock decides that the key is being simultaneously accessed by more than one copy of the program. This would cause the program to abort.

> ”
>
> *The installation process for the ABC product removes the disk protection and marries the user's particular copy of the software product with his key ring serial number.*

2. The ability to make it difficult to patch the program code that checks the key. This would involve placing some essential part of the program code or structure on the key itself. Each time the key is called, it would return an essential part of the program. With the essential part missing, the program would not execute properly or would simply abort.
3. An algorithm, parts of which are in the program code and parts of which are on the key, that unlocks the software lock. For example, a simple algorithm would do the following: The lock would generate a 64-bit random number and send it to the key. The key would receive the 64-bit random number and "hash" (compress) it into a 12-bit number. The key would use this 12-bit number as an index to a 4K-byte number table and return a number to the lock. In the meantime, the lock would also have done the same thing to the 64-bit number. When it got the answer back from the key, the lock would compare its answer with the key's answer. If the two matched, it would authorize use of the product.

In addition to Adapso's Technical Protection and Public Awareness Program, the association is also pursuing legislative and litigative remedies as appropriate. During the 1985 session of Congress, the association will support legislation to increase federal penalties for willful copyright infringement to $250,000. In addition, it will back a bill expected to be reintroduced by Sen. Charles Mathias (R-Md.) to stop short-term rental of computer software without the agreement of the software publisher.

Adapso also will file lawsuits on behalf of the industry against organizations that have established patterns of software copyright abuses.

About the author

Marv Goldschmitt is vice-president of Lotus Development Corp. in Cambridge, Mass.

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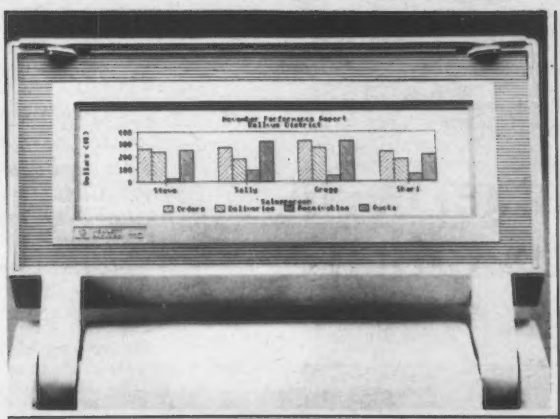

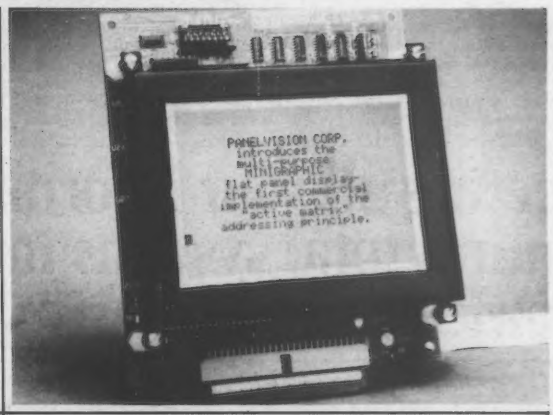

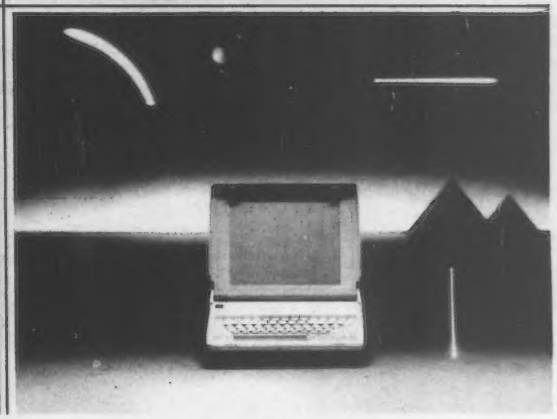

A new face for terminals

By Charles Apt and John Ketchum

Flat panel displays may soon change the way users look at their terminals. Demand for the three most promising technologies (liquid crystal, electroluminescent and plasma displays) skyrocketed from $4.8 million in 1982 to $54.9 million in 1983 (see Table 1 on ID/12). According to an Arthur D. Little, Inc. market study, this trend will continue, pushing demand to almost $4.3 billion by 1992. At that rate, in another eight years, more than one out of three office video displays will be flat panels.

In part, this rise in demand is riding the office automation boom. In the area of business personal computers alone, more than 2.4 million units were sold in 1983. According to our market study, this number will increase by 50% this year and reach 28 million by 1992.

Thus the major commercial market for flat panels will be office/business applications, including word processors, data entry terminals and personal computers.

Flat panels are ideal for portable computers because they are rugged, compact and use less power than CRTs; so portable computers will constitute the most important part of this market. A number of products are already available (see Table 2 on ID/14). However, at the current state of the art, flat panels

are expensive and cannot offer the same brightness, contrast and resolution as a monochrome CRT. In addition, full-color flat panels are some way off. Therefore, CRTs will continue to dominate where low cost, color or high resolution is critical.

Secondary commercial markets for flat panels include: automotive applications, such as displays for navigation; industrial applications, such as computer-aided design and manufacturing (CAD/CAM), image processing and process control; financial applications, such as automated teller machines; and telecommunications applications, such as data display phones. Again, these are areas where a sturdy, compact display that uses little power is desirable.

However, before these displays can fulfill their promise, certain issues must be resolved. Liquid crystal, electroluminescent and plasma displays all suffer technical problems that must be solved to improve viewing. In addition, because they are new, the performance and life span of these displays are not certain. Techniques for manufacturing flat panels in commercial quantities (more than 10,000 units per month) have not been developed fully. This delay keeps prices high, but costs will drop once the learning curve takes effect.

Type	1982	1985	1987	1992
LCD	2.3	505.3	1,281.9	3,038.7
ELD	0	22.1	179.6	716.7
Plasma	2.5	68.9	179.7	526.7
Total	4.8	596.3	1,636.3	4,282.1

Source: Arthur D. Little, Inc.

Table 1. World demand for flat-panel video displays (in millions of dollars)

Of the three reigning types of flat panel, liquid crystal displays (LCD) hold a commanding lead. RCA Corp. began developing LCD technology in the early 1960s. The technology was first used in watches and calculators in the early 1970s, and since then it has been applied to increasingly larger displays. Today, LCD penetration of the office electronics market is well under way. Recently, Apple Computer, Inc., Hewlett-Packard Co.and Data General Corp. introduced kneetop computers featuring LCDs. Currently, the largest of these displays has 25 lines of 80 characters each. Sanyo Electric Co. Ltd., Seiko Instruments, Inc. and Sharp Electronics Corp. are, or shortly will be, supplying half-page versions in commercial quantities.

LCDs differ from other displays in that they reflect light instead of emitting it. As a result, they use very little power. However, larger LCDs tend to have limited viewing angles and low contrast ratios. For example, the Sharp, Sanyo and Seiko displays reportedly have viewing angles of about 25 degrees and contrast ratios of less than 5:1 — about that of a newspaper. CRTs have contrast ratios of about 25:1.

> ”
>
> *Liquid crystal, electroluminescent and plasma displays all suffer technical problems that must be solved to improve viewing.*

Nevertheless, LCDs remain an attractive alternative to CRTs for applications requiring a display that is rugged and compact and uses little power. Further, all of the Japanese suppliers, as well as Panelvision Corp. in the U.S., are hard at work on improving performance. Conceivably, improved technology could be available by 1987 or 1988.

Liquid crystals

As the name suggests, LCDs are based on the use of liquid crystal materials. Liquid crystals are structured liquids with rod-like molecules that have many of the light-bending characteristics of solid crystals. There are three types of liquid crystals: nematic, smectic and cholesteric. The molecules in nematic liquid crystals line up to produce ordered layers stacked one upon the other (see Figure 1a on ID/14). The ordering in smectic material is similar, but the material is denser (Figure 1b). Molecules in cholesteric material also stack in layers, but these layers have the relative twist and tilt shown in Figure 1c.

The type of large LCD most commonly used commercially, the twisted nematic (TN) display (see Figure 2 on ID/15), makes nematic material take on the same spiral configuration as cholesteric material. A TN display consists of a layer of nematic liquid crystal material sandwiched between two plates of glass. A cross polarizer is placed on the outside of each plate; the orientation of the front polarizer is perpendicular to the back one. A reflector is placed on the back of the display.

Each cell (or pixel) of a TN display is designed so that when the pixel is in the bright state, the rod-like molecules are twisted into a spiral configuration (see Figure 3 on ID/15). This spiral twists light coming in through the front polarizer, orienting it so it can pass through the back polarizer to the reflector. Then the spiral twists the reflected light,

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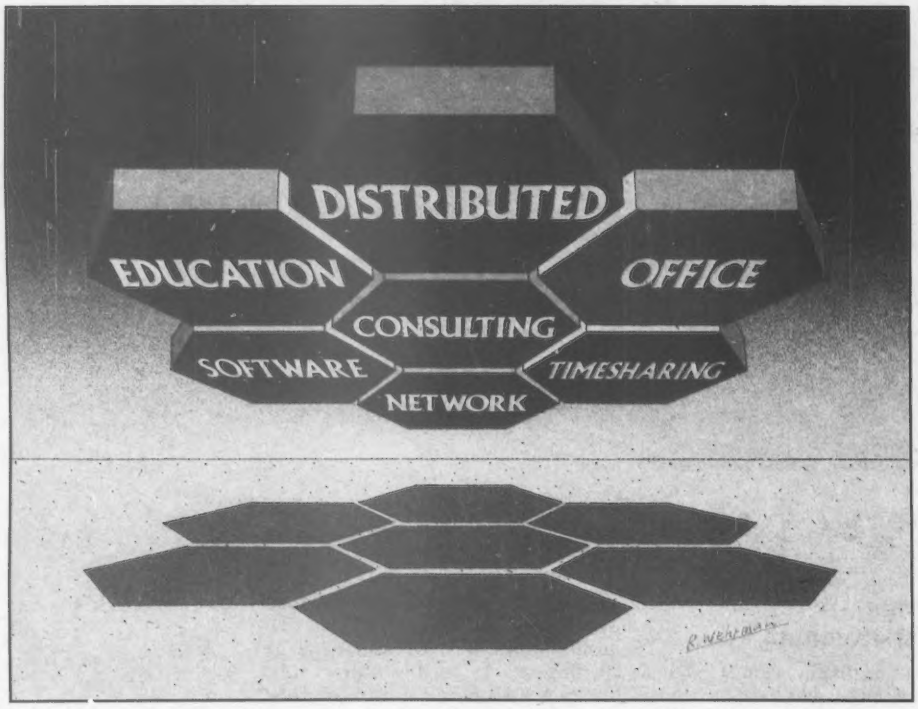

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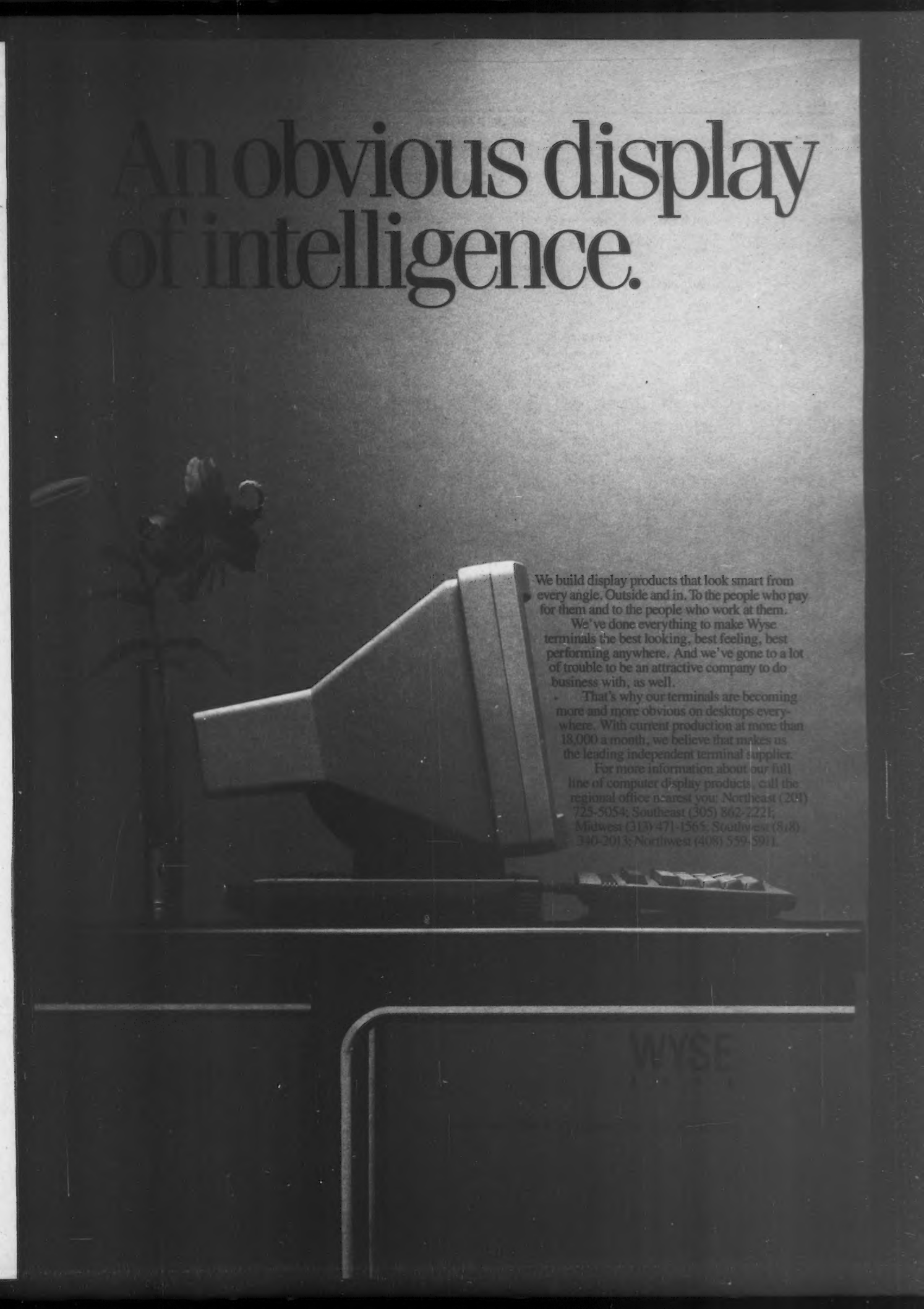

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Type of system	Type of display	Company/product	Weight (lb)	Size of display	System price
Kneetop (briefcase)	Liquid crystal	Apple Computer, Inc. Model IIC	7.5	24 lines, 80 char.	$1,300
	Liquid crystal	Hewlett-Packard Co. Portable, Model 110	9	16 lines, 80 char.	$3,000
	Liquid crystal	Data General Corp. One	9	25 lines, 80 char.	$3,000-$4,000
	Electroluminescent	Grid Systems Corp. Compass	10	25 lines	$3,450-$8,000
	Liquid crystal	Sharp Electronics Corp. Personal Computer 5000	11	8 lines, 80 char.	$2,000
	Liquid crystal	Tandy Corp. Model 100	4	8 lines, 40 char.	$399
Transportable	CRT	Compaq Computer Corp.	26	25 lines, 80 char.	$2,700
	CRT	IBM Portable Personal Computer	30	25 lines, 80 char.	$2,800
	CRT	Kaypro Corp. Model II	26	25 lines, 80 char.	$1,300
	Electroluminescent	HP Integral Personal Computer	25	24 lines, 80 char.	$4,995

Source: Arthur D. Little, Inc.

Table 2. Sampling of portable personal computers

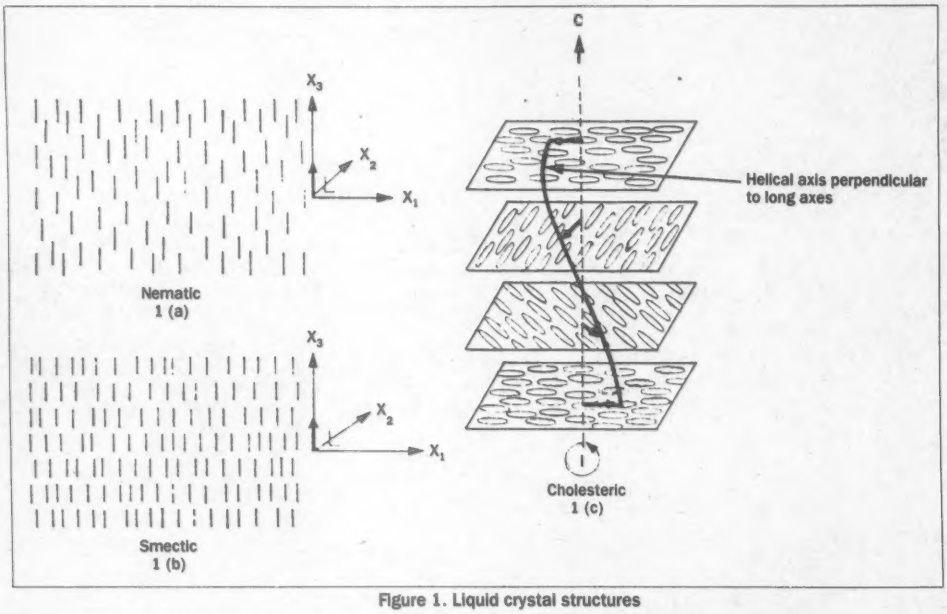

Figure 1. Liquid crystal structures

orienting it so it can pass back out through the front polarizer.

To place the pixel in the dark state, it is exposed to an applied electric field. At a certain applied voltage, called the threshold voltage, the spiral straightens out and the molecules align themselves parallel to one another and perpendicular to the front and back plates (Figure 3). Without the spiral to guide it, the light is blocked by the back polarizer and the pixel appears dark.

In small LCDs, like those in watches and calculators, each pixel is addressed directly by the voltage source. However, a half-page display requires 130,000 pixels, which makes direct addressing impractical. In TN displays, pixels are addressed via an x-y grid. Each intersection of the grid forms a pixel. When the combined voltages in intersecting x and y electrodes equal the threshold voltage, the pixel goes dark.

Today's TN displays have two major drawbacks. First, the cross polarizers block a certain amount of light, even when the pixel is in the bright state. This reduces contrast, brightness and viewing angle. Second, the larger the display, the less effective standard matrix addressing becomes. In part, this is because liquid crystal material does not respond to the peak of the applied voltage but to the root mean square voltage (Vrms). The greater the number of electrodes to be addressed, the smaller the gap between Vrms on and Vrms off. This lowers effective voltage across the pixel, which degrades contrast.

In addition, LCDs do not have a sharp threshold. Therefore, voltage applied to a single x and a single y electrode affects not only the intended pixel but also the other pixels that lie along the energized electrodes. Worse still, since all the pixels in the matrix are interconnected, even pixels quite remote from the one addressed "see" some of the applied voltage and respond. Thus, these sneak paths also degrade contrast.

Companies around the world are investigating a number of approaches to solve these problems. One avenue is the search for new and better liquid crystal mixtures, which is being vigorously pursued by universities worldwide and by the major liquid crystal suppliers: BDH Chemicals Ltd. in England; Merck and Co., Inc. in Germany; Hoffmann-LaRoche and Co. in Switzerland; and Sharp, Sanyo, Seiko and Hitachi Ltd. in Japan.

Perhaps the most promising approach being investigated is active matrixing. This involves placing an active device, such as a thin-film transistor, at each intersection of the matrix. The active device serves as a switch; it maintains the pixel in the on or off state. This eliminates sneak paths and improves contrast and response time. However, such displays are difficult to fabricate because an active device must be manufactured and installed at each pixel. In addition, the transistor yields necessary to ensure that the display does not appear flawed are around 98% — a severe constraint in a panel containing 130,000 pixels.

Another approach is the guest-host display, which eliminates the need for polarizers by introducing a special dye (the guest) into the liquid crystal material (the host). Molecules of this dye absorb light when they are at a certain orientation to it. If cholesteric material is used, the spiral order of the host/guest prevents incoming light from reaching the reflector. The pixel appears dark.

When an electric current is applied to the pixel, the spiral order is destroyed, light reaches the reflector and the pixel appears bright. Since guest-host displays operate without polarizers, they are brighter and have a better contrast ratio and a wider viewing angle than standard TN displays. However, some problems remain. The dyes used are unstable, and it has proved difficult to keep them attached to the host crystals. In addition, these displays are very difficult to multiplex.

Electroluminescent displays

Although electroluminescent displays have not made a strong showing yet, they have excited widespread interest. Sylvania made the first electroluminescent panel a quarter century ago, but practical application dates from 1974, when Sharp announced it had developed an electroluminescent display (ELD) with a long operating life. In 1980, Sharp introduced a 240- by 320-pixel display with resolution of 69 lines to the inch. These achievements convinced many that the ELD will prove a major contender in the display market.

Currently, Sharp, Planar Systems and Lohja Oy AV (a Finnish company) are beginning to manufacture large-area electroluminescent panels; Grid Systems Corp. and HP produce personal computers with ELDs; and Fujitsu Ltd., GTE and Matsushita Electric Industrial Co. are developing displays.

The type of ELD in commercial use today is called an ac thin-film electroluminescent (Actfel) display. That is, the display employs a thin-film phosphor that glows in response to an ac voltage of a certain magnitude (the threshold voltage). The

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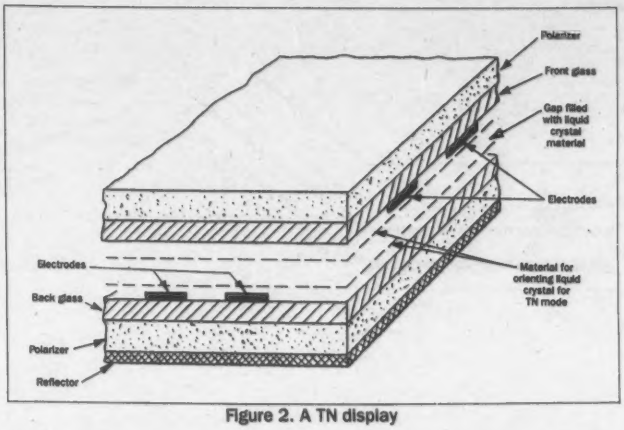


Figure 2. A TN display

basic panel consists of a glass front plate with transparent electrodes, a layer of insulation, a layer of thin-film phosphor, another layer of insulation and a set of metal electrodes placed perpendicular to the transparent ones (see Figure 4 on ID/16). These panels are matrix addressed in a manner similar to the way LCDs are addressed.

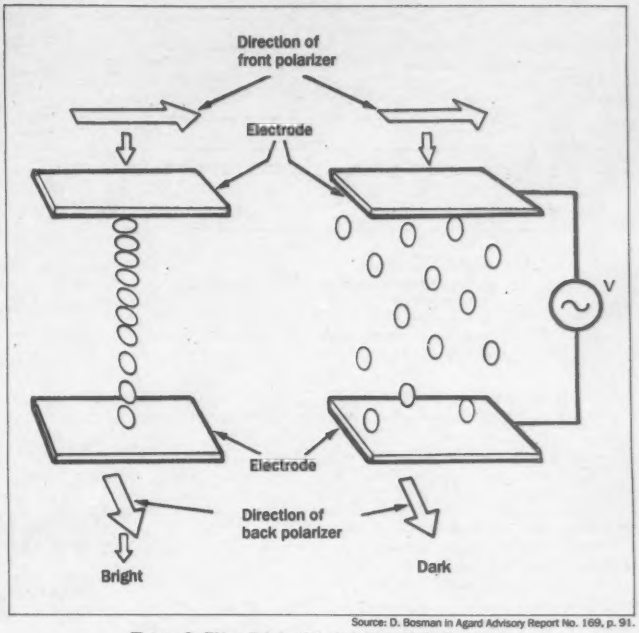
Actfel displays have many characteristics that make them desirable for such new products as kneetop personal computers:

- They weigh less than 2½ lb.
- They are less than 1 in. thick.
- The monitor face is only 6 in. by 10 in.
- They have a good pixel brightness and reasonably good resolution (about 66 lines per inch) and their contrast ratio is an acceptable 10:1. However, full-color displays are some way off. Planar Systems recently developed a blue display, and red and green are also available, but these operate at much lower efficiency than the traditional yellow.

The greatest barrier to commercial acceptance of the electroluminescent panel is the high cost of the solid-state driver circuitry. In addition, the manufacturing processes and equipment are still not established, so yields fluctuate and manufacturing costs are high. These problems will be resolved, at least to some extent, as the learning curve takes effect.

Although commercial plasma displays have been available since the early '70s, they have not managed to penetrate mass markets. The first plasma panel was developed at the University of Illinois in 1964. Two years later, Owens-Illinois entered the field, and by 1971 it was producing an ac plasma display called Digivue in limited quantities.

Control Data Corp., Bell Laboratories, Fujitsu, NCR Corp. and IBM also began to develop plasma panels in the mid-'60s. In 1981, IBM announced the commercial availability of a 750,000-pixel display, the 581 plasma display subassembly, which



Source: D. Bosman in Agard Advisory Report No. 169, p. 91.

Figure 3. TN cell (pixel) in bright and dark states

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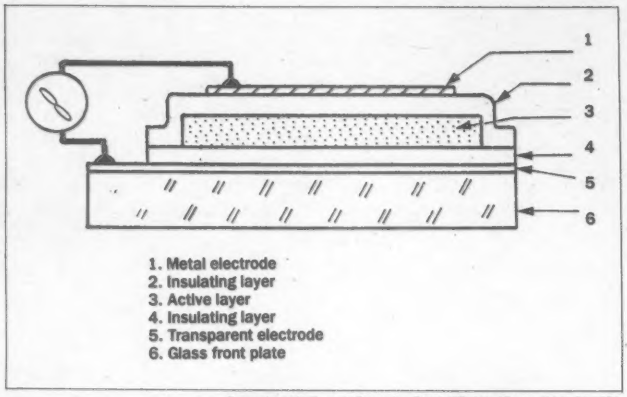
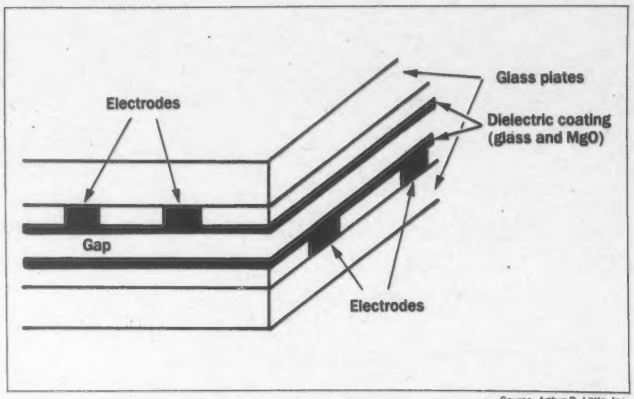


Source: Inoguchi, T., et al., Symposium Digest of Technical Papers, Vol. X, 84, 1974

Figure 4. Schematic structure of an actfel display



Source: Arthur D. Little, Inc.

Figure 5. Schematic structure of AC plasma display

is currently used in the 3179 computer display terminal. Last month, IBM announced that its 3295 plasma monitor, introduced in 1983 as a mainframe terminal, is now available for use in the IBM Personal Computer and the Personal Computer XT. This 960- by 768-line display provides 64 160-char. lines.

Today, panels are also available from Photonics Technology, Electro Plasma and Fujitsu.

Commercial plasma displays consist of a mixture of neon and argon sealed between two glass plates (see Figure 5).

As with LCDs and ELDs, plasma displays are matrix-addressable. When the neon/argon mixture is exposed to an ac current, it glows an attractive orange. The term "plasma" refers to the glowing gas.

One of the greatest advantages of plasma displays is that they can be made quite large. Ac plasma displays have been made up to one meter in diagonal and with more than four million pixels. Most commercial displays have a resolution of about 70 line/in., but some have been made with a resolution of 125 line/in. In addition, these displays have good brightness and contrast ratios up to 20:1.

However, plasma displays also have some significant disadvantages. They are expensive; the price of a half-page display varies between $600 and $800, depending on the size of the purchase order. They also operate at higher voltage than other displays and consume considerable power (about 200 microwatts per pixel). Finally, they are heavy. Because the panels contain a gaseous mixture at less than one atmosphere, thick glass must be used to maintain the proper gap between the plates.

For these reasons, plasma displays have not penetrated mass markets, in spite of their high level of commercial development. In the near future, however, plasma displays will probably find a market niche in applications where brightness and small footprint are important.

About the authors

Charles Apt is a senior member of the Electronics Systems Section at Arthur D. Little, Inc., a multinational management and technology consulting firm. Among other responsibilities, Apt conducts acquisition studies and company evaluations, performs technical audits of R&D activities and finds applications for emerging technologies.

John Ketchum is a writer/editor at Arthur D. Little.

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COMPUTERWORLD
Special Report
January 28, 1985

Applications Packages

Software comes of age

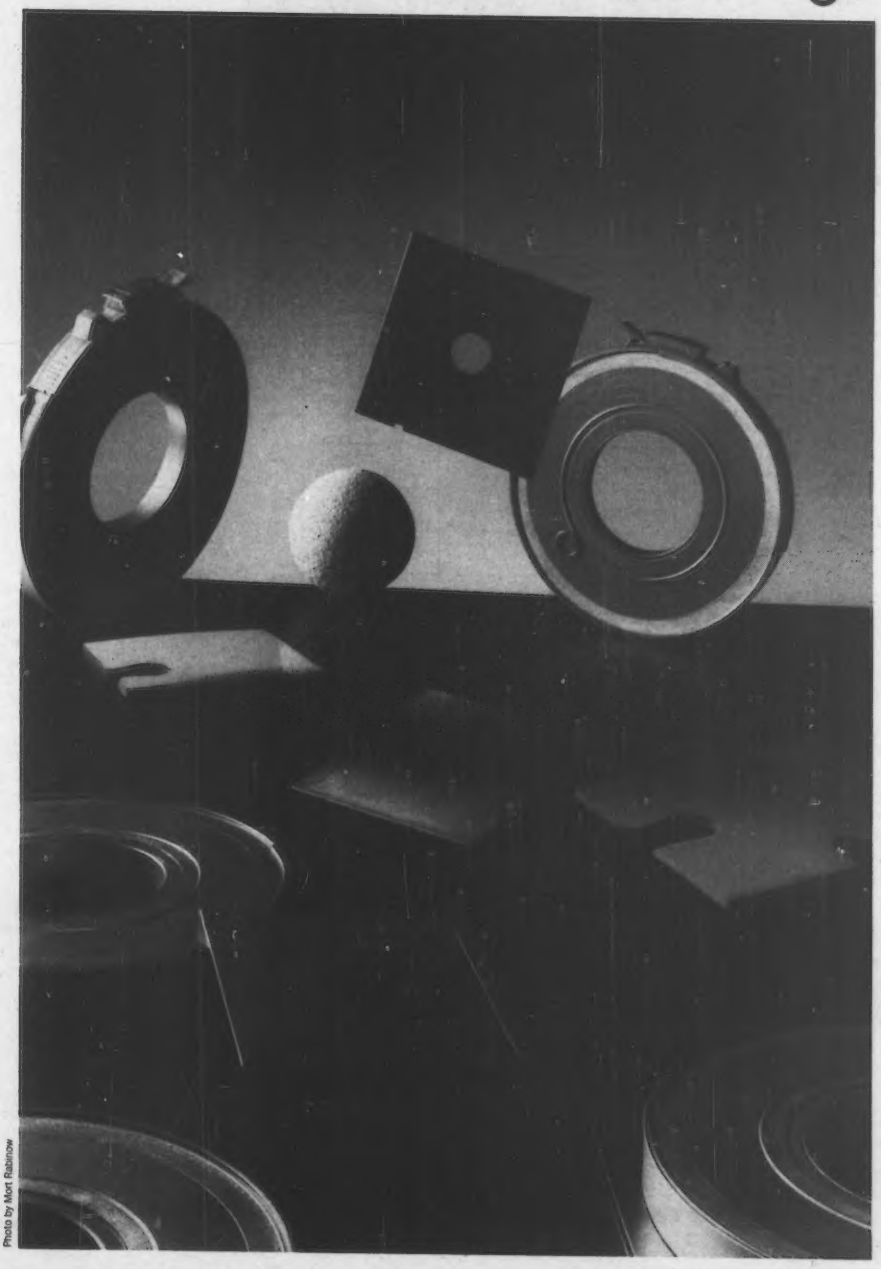

Photo by Mort Rabinow

INSIDE:

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When to build

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Software escrow: forthright or folly?

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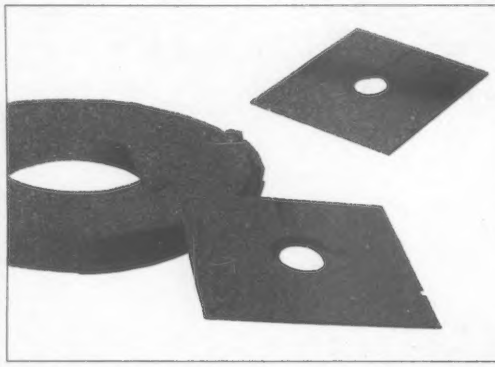
Special Report

INSIDE



Integration option: Add to existing software/**SR/3**

Users spending more on applications software; planning essential/**SR/4**

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Lessen trauma — plan ahead/**SR/22**

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Package cuts processing time/**SR/30**

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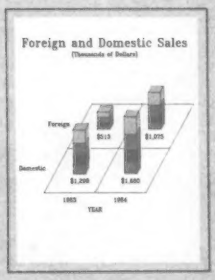

The following table illustrates INDAS's capabilities in some critical functional areas.

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Integrated graphics		✓	✓	
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The Special Report will focus on mainframe, mini and micro graphics and the blurring of the lines among the three.

In addition, it will look at the emerging low-cost computer-aided design systems for microcomputers and the easy-to-use graphics applications that are coming out for mainframe systems.

Feature coverage includes information on stand-alone and integrated applications and visual early warning graphics systems.

Also discussed will be emerging Ansi X.3 H3 subcommittee graphics standards as well as the cost-cutting benefits and time savings that graphics can provide top-level executives.

Contributions to the Special Report should take one of two forms:

■ Tutorial articles discussing issues or trends.

■ Applications stories outlining a particular user firm's experience with a graphics system or package.

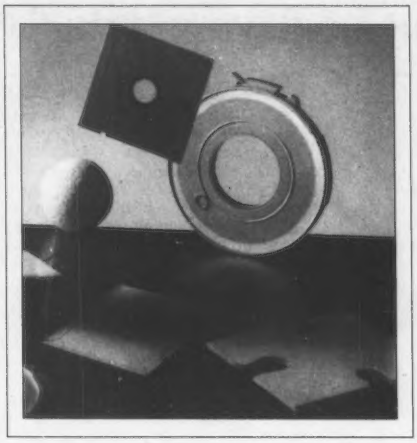
Articles may range from four to six typed, double-spaced pages. Artwork, such as charts, graphs and photographs, is also encouraged.

Authors should include brief biographies and telephone numbers at which they can be reached.

Contact the Special Reports Editor for a deadline for the March Special Report.

If you are interested in writing about emerging trends in the graphics market, including three-dimensional graphics, graphics terminals and software, developments in the color printer and output market, or boardroom graphics, contact Janet Fiderio, Special Reports Editor, *Computerworld*, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

Special Report



Integration

Putting the pieces together

By Paul Gillin
CW Staff

Just as "automate" was the application developer's bugle call for many years, today the watchword is "integrate."

Although integration is loosely defined and widely misused, it is clear that large computer users are increasingly demanding new ways to look at and manipulate data. "It's no longer enough to build an application for one purpose and expect it to continue to perform that," said David Dell, director of research at the Diebold Group, Inc., a management consulting firm based in New York. "We have to anticipate that information will be wanted for purposes for which it was not originally designed."

But just what constitutes integration and how much integration a user needs are two thorny issues. Rudimentary forms of integration have been available for several years, but many experts agree that the technology is still immature. One of the barriers to achieving true integration has been the roots that many applications systems still have in batch processes of the past.

"When I first started building systems, the computer people sent somebody they called a systems analyst out to the user community to, in effect, automate what they did," said Naomi Lee Bloom, senior principal in the consulting division of American Management Systems, Inc. "We didn't have to think about the data. What we usually ended up with was a bunch of automated systems that had the same basic flow as manual systems."

Dell added, "Originally applications were designed to do a single job well. Now much more attention is being focused on the advantages of integration in terms of lowering the costs of design coding, improving productivity and being able to move information efficiently from one application to the next."

Unfortunately, the process of retooling batch systems to include integrated features has been slow and difficult. And because technologies are changing so quickly, a standard for integration has not yet emerged, Dell noted. "The [application] software houses are not the only ones in the integration business," he said. "The data base people set some [standards], the major hardware vendors set some and everybody wants to integrate with [Lotus Development Corp.'s 1-2-3].

"People want to integrate between various functions and also [between the mainframe and the personal computer]," he noted. "Add to that the complexity of different vendors coming up with approaches to integration in their product lines and the question becomes: How do you integrate different kinds of integration?"

The topic of integration has gained importance in recent years due to two major factors: the need for improved programmer productivity and end users' desire to apply some of the imaginative techniques to corporate data that have been developed for micros.

"The market now understands that the Tower of Babel is very costly," Bloom said. "The user community is very involved, and they don't want to learn 13 different command structures for 13 different applications. The users are forcing integration."

> *'[Users] don't want to learn 13 different command structures for 13 different applications. The users are forcing integration.'*
>
> — Naomi Lee Bloom
> American Management Systems, Inc.

Software vendors have reacted with several new approaches, each of them claiming to be fully integrated. However, Bloom, whose firm also sells integrated applications software, admitted, "Vendor marketing far outstrips delivery. Vendors are better articulators than we are deliverers. We are our own worst enemies."

Wayne Pierce, manager of software intelligence at Arthur Andersen & Co. in Chicago, agreed. "Vendors have created an environment that confuses the issue for purchasers in order to differentiate their own products," he said. "By saying they're integrated, [the vendors] imply that things work very closely between one another, that data is shared. But in most cases it is still simply passed. Each application still possesses its own files, and that's a very significant difference between integrated and interfaced applications."

The approaches being taken to horizontal integration today can roughly be split into two types: data base integration and data access integration.

Integrated access is the most popular approach on the market, with adherents like McCormack & Dodge Corp. (M&D), Walker Interactive Systems, Inc., Data Design Associates, American Management Systems, Inc. and Hogan Systems, Inc. The approach is not based on a specific data base management system (DBMS) but rather provides for consistent operations across files.

With M&D's Millennium technology, for example, "The user's ability to converse with the system is identical," said Owen Boyd, M&D marketing manager for tools. "You can pull data from multiple files, cross-edit and cross-check, update and write back to files, and the files are always updated in sync. The processes define the relations, and this can change as the processes change."

Most vendors who have taken this approach have changed the on-line portions of their software to reflect this consistency but have not fully rewritten the batch modules. "Batch now does not do true processing between programs," Boyd said.

Tighter integration can be achieved if applications are designed around a common DBMS using a single development system, an approach that is advocated by data base vendors like Cullinet Software, Inc. Cullinet's manufacturing modules, for example, share one common IDMS data base, a structure that offers improved functionality and performance by minimizing the transfer of data. "Cullinet is trying to control the tools that control data and also the tools to create on-line and batch applications," Pierce said. "That is a more all-encompassing approach to integration."

On the other hand, a data base approach is more expensive because it requires a commitment to a single vendor and the purchase and maintenance of a DBMS and related systems software. Critics also claim that outside of high-volume processing, data base integration does not offer much more function for the far higher cost.

A third but increasingly rare option involves building interfaces between existing application modules to perform some rudimentary data passing. The option is by far the cheapest and requires the least commitment to a specific vendor. However, it is a far cry from integration.

Although much talk has revolved around various approaches to integration, many observers agree that a basic issue has been ignored; namely, how

See INTEGRATE SR/10

Integration option: Add to existing software

Organizations could effectively achieve many of the benefits of integration for less money by putting products on top of existing applications software that offers consistent data access, analysts agree.

Some available products include query languages, report writers, fourth-generation languages, application generators, decision support systems and micro-mainframe links.

"Some of our clients are using [Information Builders, Inc.'s] PC/Focus as a front end to their applications to achieve a kind of integration," said David Dell, director of research at The Diebold Group, Inc., a management consulting firm based in New York. "In that case they don't have to redo the personnel system but can get some of the added value of integration through a stopgap measure. They've got sufficient integration for a task, but they haven't done anything major to that program."

Daniel Pfau, a principal at Index Systems, Inc., a Cambridge, Mass.-based consulting firm, said many integration projects fail because businesses focus too much on the technology and too little on the type of integration they need.

"Newer technologies like fourth-generation languages can be used to solve some of the smaller problems rather than looking for a large integrated system to solve any problem that might come up," he said. "Once you decide what kinds of integration are going to pay off, then I think you can look at the technology — but not before."

Special Report

Users spending more on applications software yearly,

By Jack Keen
Special to CW‡

Applications software is the growth leader of the information services marketplace. More users will spend more dollars on these packages than on any other type of information service during the next five years.

As shown in Figure 1, $6 billion was spent on applications software in 1984 in the U.S. alone. By 1989, annual user expenditures will almost quadruple to more than $23 billion, a 31% average annual growth rate.

But, in spite of this healthy market expansion, all is not well. Many organizations are underestimating the short- and long-range implications of acquiring the proper packages.

> *Any applications software purchased locks an organization into procedures for doing business for at least three years — the typical life of an application. In essence, the company becomes married to the way of doing business that is built into the code itself.*

Applications packages' impact

Information systems are rapidly becoming a critical competitive weapon as businesses battle for marketplace supremacy. Packaged applications software, with its alluring price and faster implementation potential (as compared with custom-developed software), is a natural response to the need for a cost-effective arsenal.

Unfortunately, too often overlooked is the fact that any applications software purchased locks an organization into package-induced methods, policies and procedures for doing business for at least three years — the typical life of an application — following product selection. In essence, the company becomes married to the way of doing business that is built into the code itself.

Rather than discovering applications software inadequacies later that could result in premature abandonment of the package or costly revisions, applications software product buyers are urged to do the following:

- Take a closer look at current trends and developments likely to shape information systems needs and opportunities during the next five years.
- Incorporate the implications of such findings into today's selection criteria for applications software.

Outlined below are several important characteristics of the information systems environment that those acquiring applications software should take into account.

- **More applications integration.** Applications are becoming integrated faster than many people realize. Applications software integrated with data base management systems (DBMS) will increase to where it will comprise one out of seven applications software expenditures by 1989. Also by the end of the decade, more than one-third of all software products will require micro-mainframe link capabilities.

Most systems will eventually interconnect in a corporate-to-department-to-individual hierarchy. As a result, functions that an applications software package can perform by itself will often be less important in the future than how well the package can support and be supported by systems with which it must coexist. Today's buying criteria should reflect this trend.

- **New looks from old vendors.** Many vendors, in a quest for expanded market penetration, are broadening their product lines beyond their traditional roots. This expansion assumes many forms. For example, both Cullinet Software, Inc. and Cincom Systems, Inc. (leading DBMS systems software vendors), as well as Management Science America, Inc. (a leading financial systems vendor), are aggressively selling industry-specific applications to the manufacturing industry.

Numerous professional services vendors are now marketing software products that are derivatives of their custom software development contracts. Auxton Computer Enterprises, for example, is offering as applications software an industry-specific system developed for New England Telephone Co.

Many well-established vendors in remote computing services and turnkey systems markets will also be-

---

Keen is vice-president and director of vendor and user research programs for Input, Inc., a market research and consulting firm specializing in the computer software and services industry.

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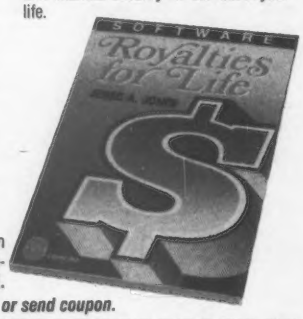

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Special Report

but planning essential before buying

come vendors of software products. These vendors will carve out market and applications specialities and then offer customers a variety of delivery modes for providing solutions to common problems.

This "market migration" tendency represents both an opportunity and a challenge for applications software buyers. On the positive side, additional sources are providing new product alternatives. Conversely, vendors run the risk of stretching themselves too thin resource-wise if they are not realistic about their competitive potential. Criteria for applications software buying must make judgments regarding these issues.

■ **The role of IBM.** IBM's overall software strategy should be an important portion of any criteria for buying applications software. By the year 2000, Big Blue is projected to be a $400 billion firm, with no less than $100 billion coming from software- and information-related services.

However, for the next five years, IBM will focus primarily on systems rather than applications software. Although it will have many applications software offerings, it will put the most emphasis upon and fight the hardest to win those competitive battles involving operating systems, Systems Network Architecture and DBMS-related products. These products form the heart of the centrally controlled distributed processing systems world upon which IBM depends for maximum account control.

Not until the beginning of the 1990s will the computer giant shift its primary business focus to the electronic office and to the applications-related software that supports it.

As a result of IBM's strategic thrusts, independent applications software vendors are more likely to gain the support of IBM than incur its competitive wrath. IBM is more comfortable coexisting with applications software vendors because more applications software begets more IBM hardware. In addition, these vendors are less of a threat to account control than are systems software firms. Because IBM's attitude contributes to the well-being of applications software vendors, users should factor this aspect of vendor viability into their buying equation.

■ **Expect more big vendors.** More deep-pocket firms will be competing for software and services sales during the rest of the decade. Whereas independent vendors currently comprise more than two-thirds of the information services market, they will account for less than 60% by 1989. Computer communications firms will boost their share from 10% to 16% during the next five years. The greatest growth, however, will come from subsidiaries of larger companies. This type of vendor will expand from 10% of the current market to 19% by the end of the decade.

However, vendor size and product brand-name familiarity do not necessarily bring applications software happiness. Whereas these large firms have the potential to bring such positive benefits as more heavily funded product-enhancement efforts and longer term commitments to a given market, there are disadvantages.

For example, the entrepreneurial zeal that has produced many unusually innovative products may be missing. In addition, the organization, because of its size, may be slow to react to marketplace changes, thus resulting in a too-slow product enhancement policy.

Buying applications software is a strategic business decision. To avoid disappointments caused by systems that look good today but are ill-fitted to tomorrow's needs, monitor the big picture when establishing the buying criteria. Especially important questions to ask include:

■ Does the vendor have a viable, realistic long-term product plan?

■ Does it satisfactorily take into account micro-mainframe links and other integration issues?

■ How much is the vendor really committed to the market represented by the software offered? What evidence exists that the vendor truly understands this application area?

■ How large is the staff (not how large is the company) that develops and supports this software under consideration? Is it experienced in this area or is it just learning?

■ Who is the vendor's main competition? Is that competition a threat to the vendor's long-term survival? If so, what must it do to prosper? Will it do it? When?

In a nutshell, buying applications software is a multibillion-dollar undertaking that will affect the destinies of businesses of all sizes.

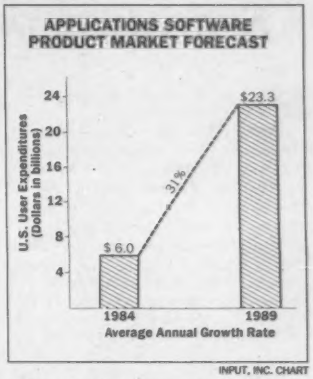

Figure 1. U.S. user expenditures for applications software products are expected to quadruple by 1989.

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Special Report

Spiraling personnel costs a factor when determining

By Gary Layton
Special to CW‡

Cost analyses from a recent Dun & Bradstreet Corp. study showed that building a program in-house costs approximately $8 per instruction vs. the $1 per instruction it costs for an off-the-shelf applications program.

In addition, the analysis revealed that the maintenance costs of custom-built packages run 50% to 55% of the program's cost per year, while packaged software maintenance is 20% to 25% of the package cost per year.

Often, companies attempt to please end users and battle the backlog by hiring more programmers. But there are project management studies indicating that what requires 100 hours for one person to complete will not necessarily be accomplished by 100 people in one hour.

Skyrocketing personnel costs

The fact is that qualified staff is hard to recruit and costly to pay. Processing power costs have decreased 700% in less than 20 years, whereas personnel costs have skyrocketed the opposite way.

Packaged software is a necessary and useful tool in meeting the expanding demand for new applications programs, especially when cost and resources are an important consideration.

In addition, many business processes, such as financial applications, are uniform, which makes packaged software products an acceptable solution.

> *A Dun & Bradstreet Corp. study revealed that maintenance costs of custom-built packages run 50% to 55% of the program's cost per year, while packaged software maintenance is 20% to 25% of the package cost per year.*

When considering what type of packaged software tools to provide for end users, the DP executive should keep several things in mind. First of all, how easy to use is the product from an end-user perspective? Is it menu-driven? Cursor controlled? Does the software allow the end user to do some simple programming or forms generation to alleviate some of the data center's programming burden? Is the product on-line and interactive? Does the end user feel it answers all of his applications needs?

Quite aside from the end-user prerequisites of the product are stringent expectations of the product from the data center staff.

Unnecessary strain on system

Do the packages generate a lot of I/O? If they do, they will put unnecessary strain on the entire system and slow it down to unacceptable levels. How many CPU resources will be needed? If the product is integrated with others — for instance, a general ledger, accounts payable and accounts receivable — do they share common routines and common code?

Scheduling is a very complicated

Layton is product manager for Computer Associates International, Inc.'s application division, based in Jericho, N.Y.

FIGURE A

Once you have established the precise requirements and needs of the software system, do a fast check for yourself. If you answer yes to a majority of these questions, you should build.

	YES	NO	DON'T KNOW
Is your need specific to your company?	___	___	___
Is it more costly to build the product?	___	___	___
Is it easy to modify products on the market?	___	___	___
Is it more costly to build than modify existing products?	___	___	___
Can we support the product internally?	___	___	___
Can we provide staff training internally?	___	___	___
If it is important for this product to integrate with existing systems, can we build it to do so?	___	___	___
Can the product be built?	___	___	___
Do we have the time to build the product?	___	___	___
Do we have the resources to build the product?	___	___	___
Can we maintain the product internally?	___	___	___
Are funds available to develop and maintain this product?	___	___	___

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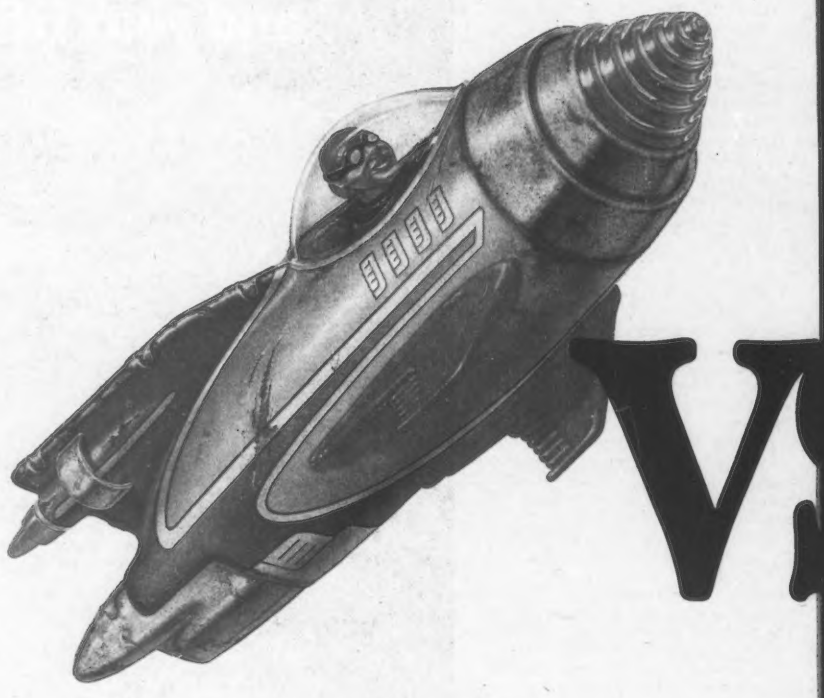

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Special Report

whether to buy or build applications software

process in the data center. If the package is not on-line, how much batch processing time does it require?

And what are the recommended cycles for the jobs? Does the product have its own security controls? How much disk space will the product require? What is the estimated growth rate of the data base? How much maintenance does the product require? How much modification? Are the products user-defined or parameter-driven to allow for easy modification?

Special nature of certain applications

Due to the special nature of certain business applications, it is often necessary for a corporation to develop many of its own applications programs.

In-house development produces a 100% match to specific needs. If resources and time are not a factor, this is the ideal solution. Unfortunately, the reality in most companies is that there is a shortage of good programmers and severe budgetary constraints.

One way to maximize the in-house development effort is to provide productivity tools to aid in the performance of programmers. There are productivity tools to aid in all phases of the programming cycle: definition phase, design phase, prototyping stage, coding storage, testing and debugging and finally the maintenance phase.

Whether the DP executive's decision involves buying or building the program, he should first develop a request for proposal outlining all the needs of both the end user and the data center.

> ”
>
> *In-house development produces a 100% match to specific needs. If resources and time are not a factor, this is the ideal solution. Unfortunately, the reality in most companies is that there is a shortage of good programmers and severe budgetary constraints.*

Preliminary paper analysis

He can then make a preliminary paper analysis of products on the market, their features, facilities and costs.

He should determine if the percentage match of a purchased program to his needs is acceptable. If unacceptable, he can assume he will either have to modify the program, modify his needs or custom-build the solutions.

To help make that determination, a quick reference guide is useful, see figures A and B.

FIGURE B

If you answer yes to a majority of these questions, you should buy.

	YES	NO	DON'T KNOW
Can the software solution be purchased?	___	___	___
Can existing products be modified?	___	___	___
Is the product we are looking at parameter driven?	___	___	___
Will the product change with our needs?	___	___	___
Would we need more systems expertise to build the product?	___	___	___
Would we need more end user expertise to build the product?	___	___	___
Is our programming staff turnover high?	___	___	___
Is the end user staff turnover high?	___	___	___
Is support provided by the vendor?	___	___	___
Is training provided by the vendor?	___	___	___
Is maintenance provided by the vendor?	___	___	___
Will the purchased product integrate with our existing system?	___	___	___
Is the product an industry standard, i.e., sort, tape manager?	___	___	___
Is there a government or industry regulation being met with the software i.e., auditing, security?	___	___	___
Does the solution match the majority of our needs?	___	___	___
Would we need additional personnel to maintain the in-house product?	___	___	___
Is this a single user need?	___	___	___
Could it be off-loaded for a micro?	___	___	___

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Special Report

Integrated software key to firm's system upgrade

MILPITAS, Calif. — When modem maker Racal-Vadic, Inc. here outgrew its batch processing system three years ago and set out to put together a replacement system, it centered its plans around obtaining integrated, database-oriented software.

Racal-Vadic

The firm had purchased a Sperry Corp. 9030 mainframe and installed financial and manufacturing software in 1979, when it was a $19 million/year company with a rather simple, centralized manufacturing organization. Since then, Racal-Vadic has expanded its revenue to $100 million annually, added manufacturing plants and distribution centers and opened regional offices throughout the country.

Early in 1982, Racal-Vadic's top management committed itself to a five-year MIS plan to bring up an on-line system that could keep up with the company's expansion.

The plan dictated that software applications for separate departments run off a centralized data base, according to Robert Swetavage, the firm's MIS manager. "In a high-growth, multiplant environment like ours, we believe that maximum integration of our applications across the company is crucial to our future success," Swetavage said.

> *'The advantages of the integrated approach include more timely and consistent data [and] greatly reduced data redundancy.'*
> — Robert Swetavage, Racal-Vadic

With such a setup, managers in financial and manufacturing departments can access at will current data from all divisions of the company. Having current information from throughout the firm allows them to respond quickly to changes in the marketplace, to evaluate immediately the effects of business decisions and to stay competitive in general, Swetavage said.

Racal-Vadic issued a request for proposals to software vendors and, after considering the replies it got, purchased Cullinet Software, Inc.'s IDMS data base and modules of the vendor's financial and manufacturing systems.

The firm chose Cullinet because it offered integrated data base and applications software, Swetavage said. "Everyone else used the [data base management system] as a vehicle for implementing applications, with little or no integration involved."

Modular design appealing

Cullinet also offered an integrated data dictionary, a fourth-generation language and some other tools Racal-Vadic wanted, along with a modular design that appealed to the firm, he said. "I didn't have to bring everything in at one time."

Racal-Vadic signed a contract for the software in July 1982. In September, it ordered a 4M-byte IBM 4341 for delivery in February 1983.

Even before the mainframe was on order, the firm began sending staff members to Cullinet's training centers to prepare for the data base and the firm's initial software application, general ledger, both slated for installation in March 1983.

The firm then linked two terminals in its headquarters here to a mainframe at a Cullinet data center in Westwood, Mass., that was running a copy of the general ledger software. Racal-Vadic established the link because it had to make changes to the software's chart of accounts but did not have a mainframe on which to do the work. Over the same communications link, DP staff members received additional training on the software and ran some tests.

As planned, Racal-Vadic installed the 4341 in its headquarters in February and brought up the data base and general ledger software in test mode during February and March. On April 1, the software was in use, recording finances for Racal-Vadic's new fiscal year, which began that day.

Swetavage said the firm brought up its general ledger before other financial and manufacturing modules partly because it needed the software running at the start of the fiscal year. If it had come up later during the

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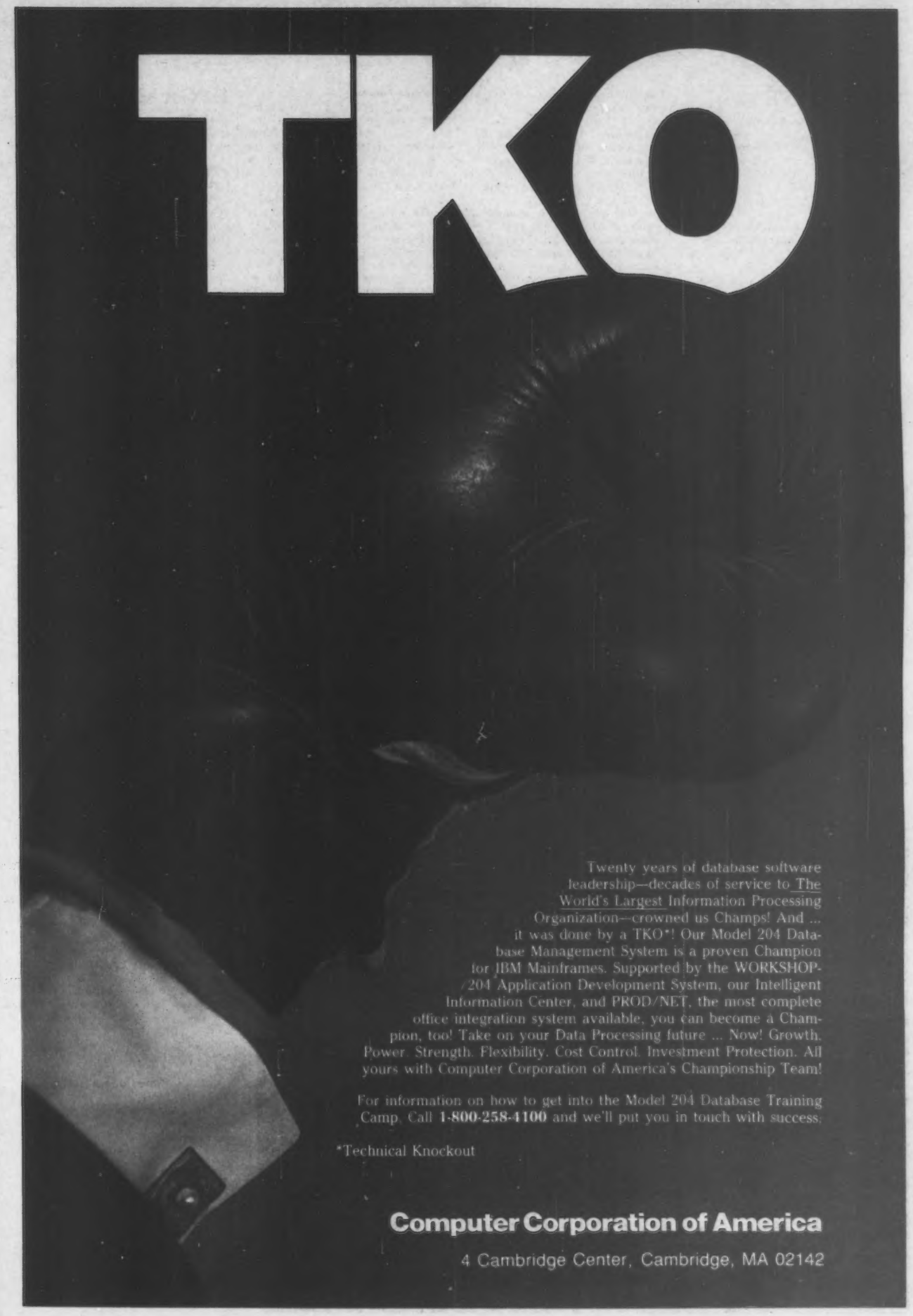

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INTEGRATE from SR/3

much integration users really need.

"In some ways, I would try to dissuade people from integrating right away because I think there may be a tendency to overintegrate where it's really not valuable," said Daniel Pfau, of Index Systems, Inc. in Cambridge, Mass.

Boyd added, "I've found that customer wants are usually totally unrealistic compared to what they can really get."

Large-scale integration in most cases requires a near-total redesign of existing software and may entail even greater expense if a DBMS is involved.

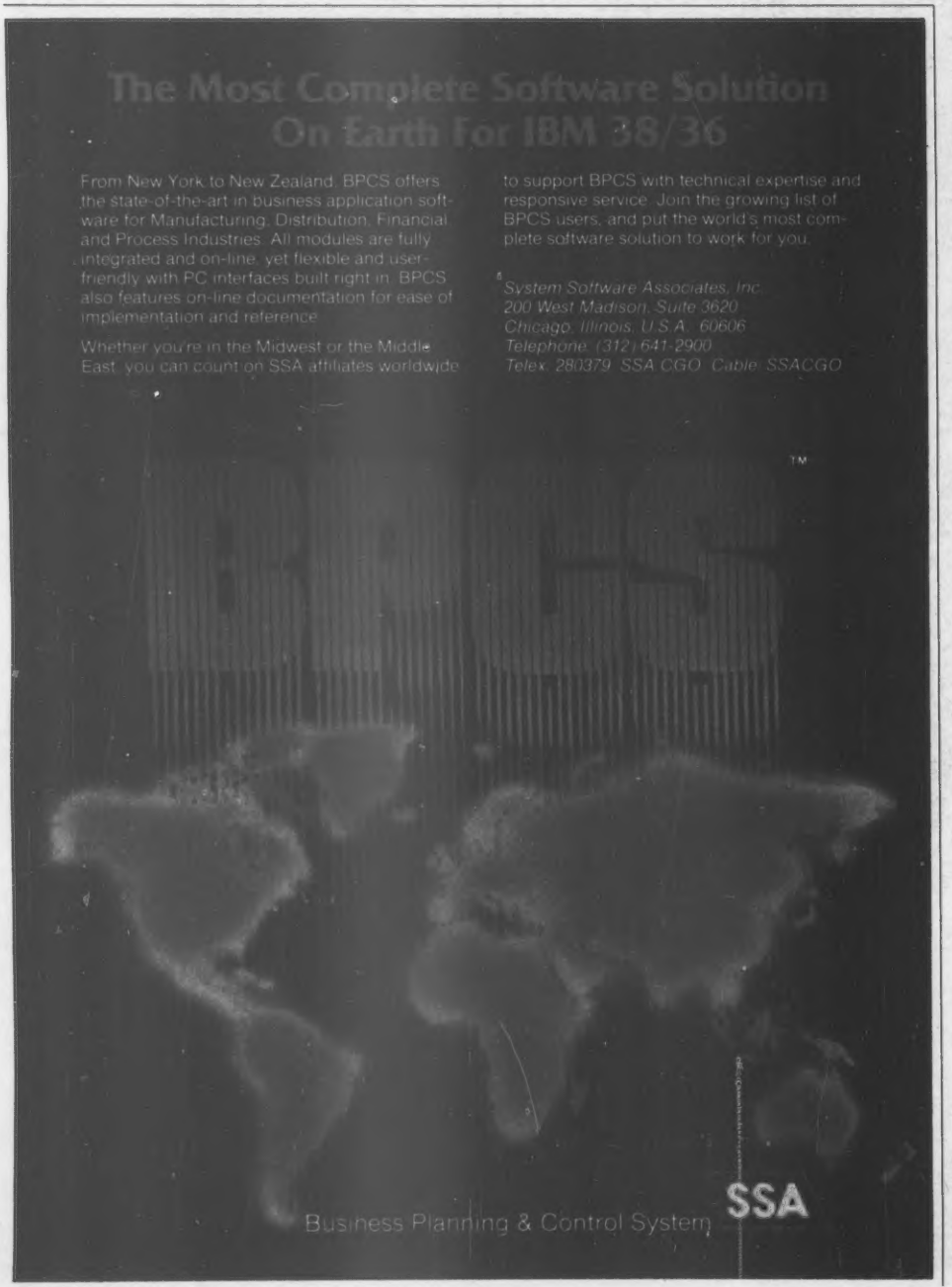
For that reason, experts agreed, companies should be questioning seriously just how much integration they need.

Deciding how much integration is needed "is the biggest question right now, and there isn't any right or wrong answer," Pierce said. He added that users often "overestimate their ability to implement the kind of integration that they would like. And it's more expensive than they expect it to be," he said. "Rarely do you see people able to spend the amount of time and resources to achieve it."

Integration cannot be effectively achieved through simply purchasing software, Bloom pointed out. In the perfect world, a company would be able to close down for a while, analyze its business strategy and create an information architecture and systems strategy based on that analysis. Then the software would be designed by one superanalyst taking into account possible future uses of information as well as current uses. The scenario is implausible, Bloom said, "But it does help to go through the mental exercise of shutting the business down and thinking through what you would put in place in the ideal situation."

Thinking about integration has to begin with the realization that different groups use the same information in different ways. "In a product data base, integration is conceptually thinking about the product, determining what the corporation needs to know about it and coming up with a data model that allows different users to look at the product as though they were the only ones looking at it," Bloom said.

Dell added, "There are major benefits to determining what can be integrated and what doesn't need to be integrated, especially as more people and functions are involved."



UPGRADE from SR/8

year, Racal-Vadic would have to maintain financial data for one year on two systems.

In addition, general ledger set the stage for future financial and manufacturing applications the firm planned to bring up. "We viewed [it] as a reference that would create system disciplines for other integrated applications to comply with as we brought them on," he said.

Last summer, the firm installed the central modules of its manufacturing system — Cullinet's bill of materials, inventory control and material requirements planning. The modules went into use in September, and the firm has since begun to realize the benefits of the integrated system, according to Swetavage.

"The advantages of the integrated approach include more timely and consistent data, greatly reduced data redundancy and one set of parts master information for all departments in the company," he said.

The only programs still running on the Sperry Univac are order entry and accounts receivable. Racal-Vadic plans to install Cullinet's order entry software on the IBM system this spring and to bring up accounts receivable sometime afterward. A service bureau processes the firm's accounts payable, and a bank does its payroll.

Throughout the implementation to date, Racal-Vadic has evaluated its business practices in relation to the way its software is set up, Swetavage said. "In some cases, we've found it best to modify our procedures to conform to the package."

Finer level of detail

Cullinet's general ledger, for example, provided several more positions for data in its chart of accounts than the software that ran on the Univac did. Racal-Vadic modified its procedures to take advantage of the software, bringing a finer level of detail to its reporting.

The firm also introduced strict data entry procedures and distributed comprehensive documentation to its users. Swetavage said the integrated software requires that users enter data correctly and conscientiously, because if they enter garbage, the data base spreads that garbage to data files throughout the company.

Users have responded well to the system but have had trouble with Culprit, the IDMS report writer. Culprit is not easy for end users to learn, Swetavage said. "My programmers can use it better than my users." In turn, the programmers do all report formatting, a task the MIS department would like to relegate to end users.

Cullinet offers On-Line English, an easier to use report-writing utility, but Racal-Vadic has shied away from it because it takes up too many system resources.

As users mature on the IDMS system in the coming years, the firm will look for report writers they can operate, Swetavage said.

Racal-Vadic's other plans include installing Cullinet's master production scheduling and shop-floor control software this fall and bringing up a purchasing module when Cullinet releases it. Further in the future, the firm wants to obtain accounts payable and cost control modules.

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Special Report

Multivendor approach an option in product search

By Michael J. Green
Special to CW‡

Companies searching for application software in the mid-1980s face a formidable challenge. The proliferation of application packages offered by different software companies is making the selection process increasingly difficult.

Faced with this situation, many companies are attracted to total-solution software vendors that offer one-stop shopping and integrated packages. But the single-source software vendor may not be the panacea for which many companies are looking.

Many total-solution vendors broadened their product selection more in response to pressure from existing customers than as part of their original development plans. Software companies that built their success and reputations on a particular application, such as an inventory control system, often discovered that they had a ready-made market in their existing customer base, eager to buy any add-on module the vendor could produce.

These software developers rushed to deliver to their customers the add-on application packages they wanted, such as general ledger and accounts payable. However, the expertise that made the vendor successful with its original application system was often of little or no use when applied to radically different applications.

Many total-solution vendors created what is known as the "Snow White" effect. The temptation is there to be all things to all people. The vendor makes the sale to the prospective customer, based on the virtues of the lead product — the Snow White. The customer sees security in a single-vendor solution and winds up buying all the other add-on products. Only after all the application packages are installed does the customer discover that the seven extra modules he bought were really the seven dwarfs.

Often the benefits customers anticipate by going with a single software vendor are outweighed by the lack of functionality and capability that characterize some vendors' secondary add-on products.

However, even the strong supporters of the multivendor approach do not advocate a different vendor for each application. Companies should evaluate the add-on modules on their own merits when buying application software.

There is no doubt that some inherent problems still exist in mixing and matching application software from different vendors. But the interface and connection problems are often much less formidable than first feared. Most of the efforts in integrating packages from different vendors take place during the initial conversion and installation.

Companies searching for packaged software should consider the following points:

■ Purchase packages from the same vendor where necessary, but not in every case. Where close interaction and integration of functions is critical, it often makes sense to purchase more than one package produced by the same vendor, such as order entry and billing systems; general ledger and accounts payable packages.

On the other hand, there is often no significant reason why a general ledger from one vendor cannot work effectively with the manufacturing or payroll system produced by another vendor. In this type of situation, you should choose the best packages for your needs rather than be ruled by fears of multivendor problems.

■ A discounted price is the wrong reason for selecting a vendor's add-on product. Good software is expensive to develop. When an add-on package is heavily discounted it may be a sign that the vendor does not consider it in the same class as the firm's premier product.

The biggest cost to an organization acquiring any package is not the license fee but the start-up, internal training and ongoing operating expenses. The real financial benefits from a software purchase are the time and money you save with a good product once it is in operation.

■ Good hardware does not necessarily mean good software. The commonly held belief that good hardware vendors must also make good software is a myth.

■ Big isn't always better but too small may be worse. Although the size and reputation of prospective software vendors are important (you would like to know that they will be in business next year), much of the best software historically has been produced by young, innovative firms.

However, you should be concerned if a small firm offers too wide a range of homegrown application packages. Does it really have the resources to develop and support a large number of products? Some of them may be secondary, low-function add-on modules.

One signal is whether any of the add-ons stand up to competition on

See SOFTWARE SR/19

Green is product manager for Multiview financial software from Cognos, Inc., an independent supplier of software for minicomputers.

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Special Report

Firm pulls off software switch in three months

SAN JOSE, Calif. — When a retail computer chain decided to bring up three major accounting packages in three months, even the project's directors questioned the sanity of the move.

"To tell you the truth, I never thought we could do it," said Brian Bundy, assistant controller for Businessland, Inc. and day-to-day manager of the software implementation. But with some detailed planning and more than a few all-nighters, the project team brought up the three modules on schedule. "There were extensive hours put in by a number of individuals," Bundy said.

Businessland, which operates a national chain of retail centers that sell and service microcomputers and related office equipment, realized last February that its growing business volume was straining the capacity of the service bureau that processed its financial data, Bundy said. "We were using a fairly small service bureau, [and] we had basically outgrown it."

Between June 1983 and June 1984, Businessland opened 36 retail centers, expanding from six centers to 42. The increase in business slowed the service bureau's processing time. Businessland's financial closings took about 15 business days, leaving little time for the firm to review data before beginning a new period.

Businessland had an 8M-byte IBM System/38 in-house running inventory tracking software, so it decided to look for financial programs to run on the machine. In March, the firm bought a package of financial software modules from Software International Corp.

The timing of the purchase prompted the need for a speedy implementation. "The optimum time to bring up that financial package would be at year's end," Bundy said, and Businessland's fiscal year ended June 30 — just three months away.

Because Businessland had a small DP staff — an MIS director, one programmer and one operator — it hired two outsiders from the consulting firm Myers Holum & Co. to help with the implementation. The two consultants, along with Bundy and Businessland's accounts receivable supervisor, Edna Kincaid, worked as a team throughout the project, reporting weekly to the firm's controller and its vice-president of finance.

Core segments brought up

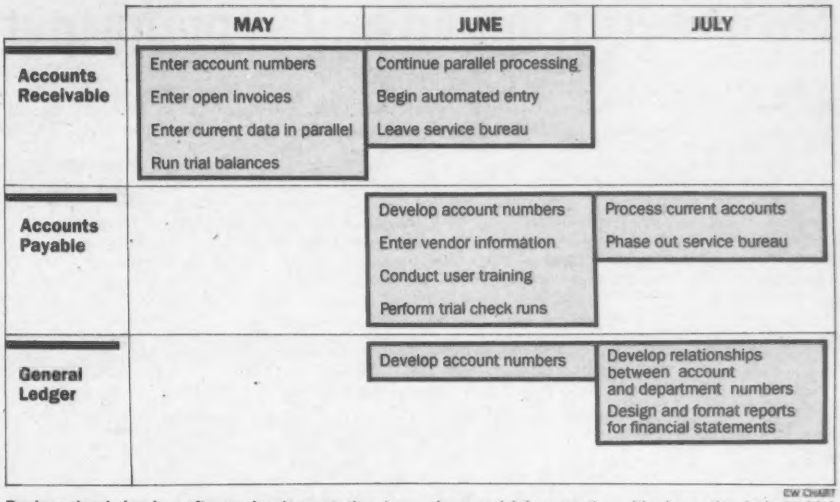
The team aimed to bring up core segments of accounts receivable, accounts payable and general ledger software by June 30 so that it could enter into the new system all financial data for the fiscal year that would begin July 1. The team decided to start with accounts receivable because, Bundy said, "it was, by far, the toughest to bring up."

Businessland maintains separate accounts receivable agings for each of its retail centers, and the firm needed to modify the software to accommodate this practice. It also needed to enhance the software so that it could generate reports that broke down accounts receivable information into different categories of retail sales.

The consultants on the project team used the System/38's query facility to generate specialized daily sales and cash receipts reports, customer lists and exception reports. Because the Software International accounts receivable system makes use of System/38 native-mode data base facilities, query reports were easy to produce, according to Mark Myers, one of the consultants.

During April, some members of Businessland's accounts receivable staff took classes from Software International. The same month, the project team obtained from the service bureau a list of all open invoices so that Businessland could enter these into its in-house system.

In May, operators spent three weeks manually entering about 2,000 customer account numbers and 13,000 open items into the system. The consultants felt manual entry would acquaint users with the software, and, Bundy said, Businessland did not have enough time to write a conversion program. Throughout the month, the firm entered its current accounts receivable records manually on the service bureau system and on its System/38. At the end of the month, the project team ran trial accounts receivable balances on the new system.



Businessland, Inc.'s software implementation began in April and continued into August, but May, June and July were the critical months during which the firm had to establish three financial systems.

During June, Businessland continued to run its accounts receivable in parallel on the two systems. An interface that Myers wrote allowed the firm automatically to transfer to the accounts receivable system data on sales and inventory that was collected from point-of-sale (POS) microcomputer systems in the retail centers. The project team checked this information against data entered manually into the service bureau system and reconciled the two weekly. By the end of June, Businessland cut over from the service bureau.

> ”
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> *The team aimed to bring up the three modules by June 30 so it could enter into the new system data for the fiscal year beginning July 1.*

While the firm was finishing work on the accounts receivable package, it was also beginning to implement its accounts payable and general ledger software. In June, the project team developed account numbers and department numbers for its chart of accounts and entered the names and addresses of its approximately 1,500 vendors into the system. During June, the team also used dummy invoices to test the system's ability to generate checks. At the end of the month, users received training on the accounts payable software.

Goals met in July

Beginning July 1, Businessland entered its current accounts payable invoices on the Software International system. With accounts receivable and accounts payable data from all its July activities going to the new system, Businessland had met its goal of establishing its in-house financial framework by the beginning of the fiscal year.

The firm kept its outstanding accounts payable on the service bureau system, allowing them to drop off after they had been paid. Otherwise, Bundy said, "We would have had to have someone sit down and revoucher all those invoices." The redrawn invoices would then have to be entered into the in-house system, opening the firm to data entry errors and taking up crucial time. "By the end of July, they would have run out anyway," he added. About a dozen accounts remained on the service bureau at the end of July. Businessland reentered these into its system early in August.

With the input programs for accounts payable, accounts receivable and general ledger established in time for the opening of the fiscal year, Businessland's project team devoted the month of July to defining relationships between account and department numbers and to formatting reports. Like the project as a whole, the month's work was under a strict deadline, Bundy said: It needed to be finished by month's end so that the firm could produce financial statements in time for its July financial closing.

Statements recreated

The project team recreated some statements that had run on the service bureau system — mainly detailed profit-and-loss statements for individual Businessland stores — and created some new reports. The most notable of the new reports, according to Bundy, was a one-page summary profit-and-loss statement that provided corporate management with one profit figure for each of several business categories.

In re-creating the detailed reports, Businessland added some refinements to allow individual store managers to break down their revenues and costs of sales by specific products and services: hardware, software, training and the like. These and other reports represent what Bundy called one of the two main benefits of the firm's new financial system: increased control over finances. "Our center managers are just elated that they're able to get financial statements that are helping them manage their centers," he said.

The other major benefit was reduced costs, according to Bundy. Businessland had paid its service bureau about $30,000 per month to process its financial data. "That [figure] has gone virtually to zero," he said. Monthly savings from doing financial processing in-house should allow Businessland to recover its system expenditures within two years, according to Bundy. The firm still keeps its fixed-assets accounting on the service bureau, but plans to bring up a Software International fixed-assets module in-house next month.

Businessland closed its July financial books 10 working days after the end of the month and has maintained 10-day closes as its norm.

Phased out dependence on consultants

Near the end of the installation project, the firm hired an in-house programmer to assume responsibility for the financial system and phased out, over a month, its dependence on the consultants. Businessland has since hired one more programmer who is dedicated to maintaining and upgrading the Software International package.

The two programmers have produced some financial reports, including an historical report generated from accounts receivable data, to supplement the reports formatted during the installation. These, Bundy said, "were more niceties than anything else." The programmers have targeted about 60 additional enhancements they would like to make to the system.

Businessland plans to upgrade its System/38 to an 8M-byte IBM System/40 within the next month. The firm recently installed a System/36 to collect data sent from the retail centers' POS systems.

Special Report

Swift setup key in guitar manufacturer's ledger pick

MERIDIAN, Miss. — For a fast-growing guitar manufacturer here, swift installation and implementation of a mainframe software system were more important than any attribute of the software itself.

"When you're trying to move along at 80 miles per hour, it's hard to stop and change a flat tire," said Jim Clark, accounting manager for Peavey Electronics Corp. here. The firm, a manufacturer of guitars, amplifiers and sound reinforcement equipment, is growing at an annual rate of about 20%.

Peavey wanted to switch from a batch to an on-line general ledger but could not afford to bring its system down or disturb account processing for any amount of time to do so. The accounting department balances cash, accounts receivable and checks every day.

By last spring, Peavey had outgrown a general ledger system that had been written in-house and was running on the firm's 4M-byte IBM 4300. The software was designed for a 56K-byte IBM System/3 and upgraded bit by bit over 10 years. It could not support the firm in the firm's present state.

Peavey runs six manufacturing plants — each divided into subplants for woodworking, electronics, metal working and assembly. The corporation is composed of four separate companies — R&D, finance, distribution and an overseas firm. A new general ledger system had to meet the needs of these many divisions, Clark said. "We wanted a general ledger system that could handle multiple companies and multilevel plants online. . . . We're international, so we also needed currency conversion, and we needed to be able to transfer funds between companies."

Clark said Peavey chose software from Global Software, Inc., partially because Global had a general ledger package that offered these functions but mainly because the firm offered a method for converting from the old software to the new without interrupting accounts processing.

> *'The Swat program is very intensified, like getting four weeks of in-house training in five days.'*
>
> — Jim Clark
> Peavey Electronics Corp.

Under the vendor's Software Walkthrough (Swat) implementation program, representatives from Global visited Peavey for two days.

During these two days, the representatives reviewed Peavey's chart of accounts and asked what the firm expected from a new general ledger, Clark said. They then obtained a taped copy of Peavey's general ledger and took it to Swat headquarters in Raleigh, N.C., where they developed conversion programs.

During the week of the actual conversion, Clark and three other accounting staff members traveled to Raleigh to study the new general ledger system and practice using it on Global's IBM 4300. By the time they arrived, Global had loaded one month of Peavey's accounts into the system. The accountants from Peavey loaded another month's work during the week they spent at Global.

Clark and his coworkers practiced and studied for most of that week, and their hard work paid off, he said. "The Swat program is very intensified, like getting four weeks of in-house training in five days."

The team left Swat headquarters on Friday and loaded the new general ledger software into Peavey's 4300 that Sunday, Clark said. The system went on-line Monday.

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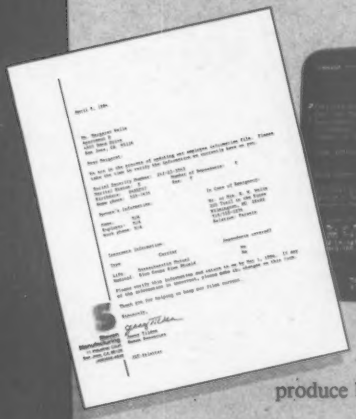

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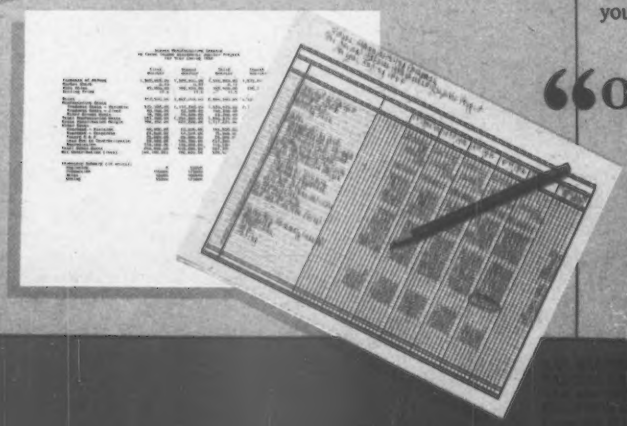

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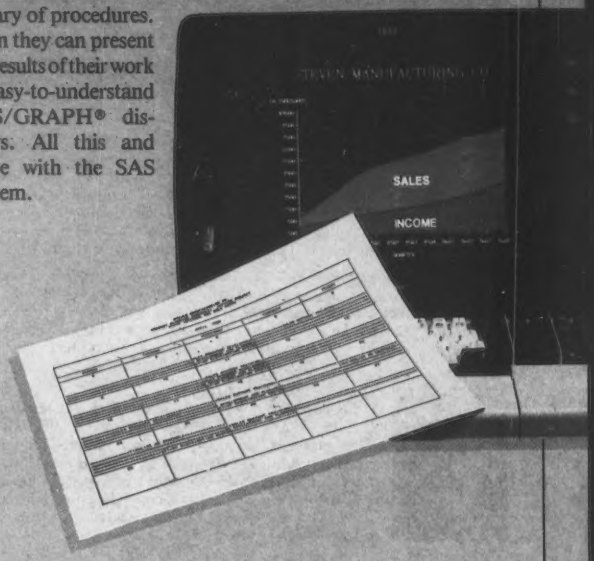

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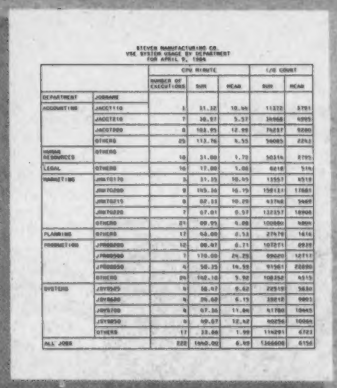

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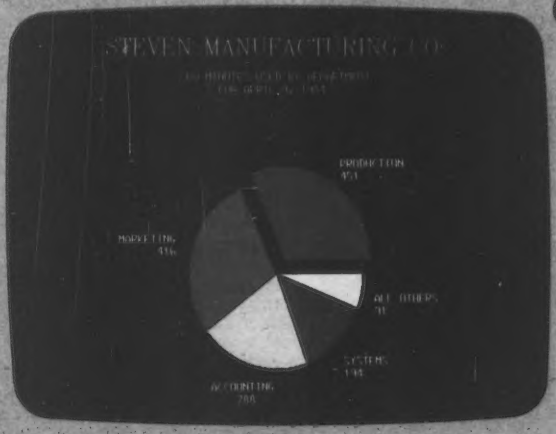

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Special Report

Shortcomings of escrow arrangements require that

By Tom Mylott
Special to CW‡

The lack of source code lurks in the background as a serious danger in acquisition of off-the-shelf software. For many reasons, vendors resist providing source code to their users. Yet, what will happen to a user if the vendor goes out of business or terminates the application's maintenance?

As a common technique of self-defense, purchasers of these packages often convince vendors to place the source code in software escrow. Software escrow can be an effective protection, but many users build escrow arrangements on foundations of sand.

The concept of software escrow lacks structure — only a vague definition of it exists. Basically, it consists of the depositing of materials, usually source code, in a location other than the vendor's in order to give a user access to the material under certain conditions. It is the vagueness of this definition that can be confusing.

While the concept of software escrow is alien to many people, some have participated in an escrow agreement when they purchased their homes.

Few software escrow arrangements, however, are established as carefully as the ones used in the buying and selling of real estate, even though the financial stakes often exceed the average price of a house.

Before determining how well a particular escrow agreement will meet your needs, some basic questions must be answered:

■ Why a software escrow arrangement? Not all users who acquire off-the-shelf packages have the same needs. Most software escrow accounts are arranged as a compromise between the user's desire to have source code and the vendor's determination not to release the code.

Users overwhelmingly prefer to have application source code in their possession, primarily so they can maintain their software. Vendors prefer not to release source code because they fear both their competitive edge and proprietary interests in the software will be jeopardized.

■ How unique is your package? If you can easily switch from one vendor's package to a competing vendor's package, the need for escrow is less than if your acquisition is unique or there is no easy conversion path to a different package. The more important your application's maintainability is to you, the more you need a strategy and procedures to make the source code accessible.

With all escrow agreements, ask these questions and make sure the answers are in your escrow contract. To succeed, all escrow agreements must meet these requirements:

■ An escrow agreement must be a written agreement — that is, a contract.

Oral promises are difficult if not impossible to enforce.

■ The escrow agent must be an independent third-party. Once you have a written agreement, determine the identity of the escrow agent.

Beware of a vendor that states you will be sent a copy of the source code if the company goes out of business. Nearly as bad is the vendor that promises the company is guarding a copy of the source code in its safety deposit box. In both situations, the vendor plays the parts of escrow agent and vendor. Both of these arrangements stretch the concept of software escrow beyond the breaking point.

Situations in which the escrow agent is the vendor's bank, accountant or some other organization doing business with the vendor are also not recommended. If you have a dispute with the vendor over your getting the material out of escrow, whom do you think this type of escrow agent will favor? The company with which it does business and earns money, or some user of whom it may never have heard?

Of course, the best escrow agent might be someone who favors you, such as your own bank. Because that arrangement leans in your favor, the vendor will likely object. Nevertheless, even an independent local escrow agent could still work to your advantage if you, the vendor and the agent come to blows.

■ Determine what should go into escrow. If the escrow agent is satisfactory, the next step is to determine what should go into escrow. Of course, the source code goes, but in what format? A copy on machine-readable media as well as a printed copy lines up as the best combination. Note, however, that possession of the source code alone can be insufficient protection. What if the vendor wrote the software in a proprietary or unusual programming language? You might need the compiler, too.

To make the source code useful, the vendor needs to hand over other materials to escrow, such as documentation, any system and program specifications that are needed for software maintenance.

■ Usually a vendor that offers sufficient answers to the "who" and "what" of an escrow agreement will answer the question of when-materi-

Mylott is an attorney with the Dallas firm of Peter S. Vogel who specializes in computer law.

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Special Report

software buyers look carefully before they leap

als go into escrow satisfactorily as well, but not always. The escrow agent should embrace the source code and documentation before or as you acquire the package.

Several variations of answers exist as to the "when" of escrow. Some vendors promise that they will place the material in escrow when a crisis looms. In the present, software escrow should console you as being an in-force insurance policy rather than something that might rescue you if you need it in the future.

Escrow of obsolete software

When the vendor will deposit material in escrow is not only a threshold issue in the escrow relationship, but also a continuing concern. Unless the deposited materials adequately reflect the application you are running, an otherwise successful escrow plan can crumble into an escrow of obsolete software. Therefore, require the vendor to update its materials.

■ How will you monitor the escrow arrangement? Another consideration is that of verifying what the vendor places in escrow. You cannot always afford to take the vendor's word concerning what it has placed there. Frequently though, the inconvenience of actually inspecting the deposited material will outweigh the advantages. A compromise is to require the escrow agent to notify you regarding all deposits.

■ When will the source code be released? Most escrow arrangements provide for release if the vendor goes bankrupt or otherwise ceases to do business. A few escrow arrangements mention some kind of software maintenance failure as another condition for release of the materials in escrow. Both approaches disguise latent problems. One approach may be illegal, the other ineffective.

■ Bankruptcy. The problem with releasing source code upon bankruptcy is that the bankruptcy laws may build a brick wall in the escrow agent's path. When a company tumbles into bankruptcy, the federal court takes over the business while seizing complete legal control of any assets that remain.

A bankruptcy court has broad powers, including the power to rip up ongoing contracts. Software escrow has yet to be baptized by the fire of a lawsuit during bankruptcy proceedings.

If the court determines the source code is a valuable asset of the bankrupt company, the judge will not let you walk away with it. Even if the court overlooks the ownership and value issues, the judge may still decide that honoring your escrow agreement is not in the best interest of the bankruptcy proceedings.

Moreover, if the bankruptcy is a corporate reorganization that causes minor maintenance problems, the court may ignore your pleas that the lack of source code jeopardizes your software support.

■ Some escrow agreements include a failure of software maintenance as a condition for release of what is in escrow. This contingency has the best opportunity to be enforceable and effective. However, it can be a worthless strategy unless your escrow contract has nailed down the components of a maintenance failure or defined inadequate maintenance.

Assuming you have lined up a neutral escrow agent, that agent wants to minimize the chances of being sued. In the face of uncertainty, the agent is unlikely to go along with your definition of satisfactory software maintenance. One way to help the escrow agent is to establish a contractual standard of software maintenance that the agent can ascertain with some objectivity, and at the same time, provide a procedure for you to spur the agent into action, particularly if the vendor fails to respond to inadequate maintenance.

A vendor that claims to have a software escrow arrangement and stands unwilling to alter that escrow should be confronted. As with any vendor claim, examine this one closely. In addition, your attorney should examine the vendor's contract with the escrow agent.

SOFTWARE from SR/12

their own right or whether they are sold only in conjunction with a Snow White product.

■ A multivendor solution requires both the right software and the right users.

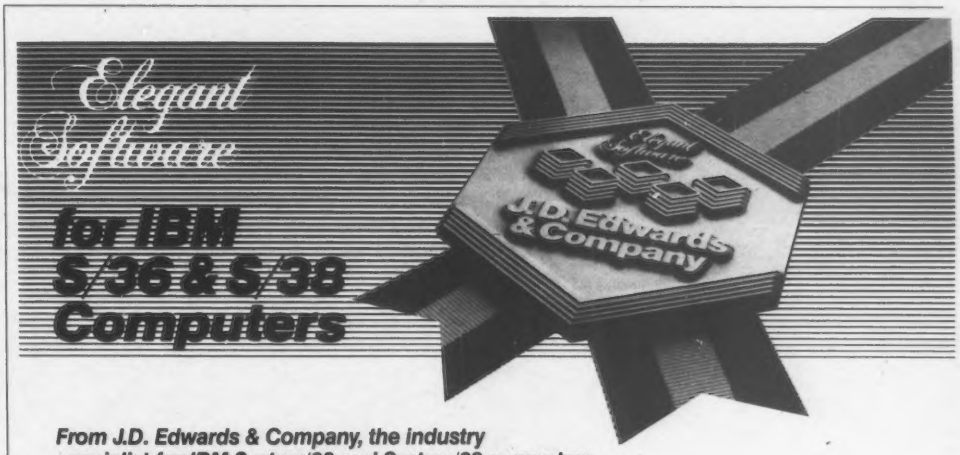
Not all software packages are suitable for integration with other vendors' products. The ability to pass files to and from outside systems is essential.

Access to the data dictionary of the other vendor's product may also be necessary to allow files to be shared by several packages.

The successful multivendor integration also requires the skills of a knowledgeable systems analyst who can help resolve the technical issues that may arise during the process of integrating products from different vendors.

The multivendor solution is a viable alternative to the single-source software vendor.

By exercising a little care, you can get the Snow White packages you need and leave the Seven Dwarfs on the shelf.



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Special Report

Integration glues shattered system

A Pfaudler employee applies a glass lining to a vessel.

ROCHESTER, N.Y. — The buzzword "integration" took on significant meaning for a manufacturer here that had to construct — from scratch — a financial system to process its own data and that of an operating group with which it merged.

After the Pfaudler Co. was acquired in December 1982 by Standard Oil Co. of Ohio (Sohio), it could not choose a package or two to supplement its system, according to Jeffrey Spink, manager of financial planning and analysis for the firm. "We had nothing that we were going to keep from our old system," he said.

Pfaudler, which manufactures 100- to 10,000-gallon glass-lined vessels that chemical and pharmaceutical firms use for mixing formulas, was merged with the process equipment division of Sohio, which makes similar vessels with plastic and metallic linings. Administrative and financial responsibility for the division rested with Pfaudler.

The firm wanted to phase out its financial system — homegrown software running on an IBM 370/158 — and tie its records with those from the process equipment division. The division tapped into an IBM 3033-based system running under MVS that Sohio ran for its operating companies. "It was a very good system," Spink said.

But Sohio announced shortly after the Pfaudler acquisition that it wanted to decentralize its DP operations and that operating companies should have their own setups by the end of 1983. Pfaudler then began looking for hardware and software to meet its needs. Because the firm was building the system from the ground up, integration was the most important criterion, Spink said. "We wanted a fully integrated financial system [with modules] that could talk back and forth to one another."

Pfaudler purchased a 12M-byte IBM 4341, then looked for software to run on it. The firm narrowed its search to two vendors, McCormack & Dodge Corp. (M&D) and Management Science America, Inc. (MSA), and chose M&D over MSA mainly because of support services, Spink said.

Financial software purchases

In June 1983, Pfaudler purchased M&D's G/L Plus general ledger, F/A Plus fixed assets and A/P Plus accounts payable software. A team of financial and technical staff members from Pfaudler attended training sessions on the general ledger package at M&D and returned to put together a chart of accounts that would serve both Pfaudler and the process equipment division.

Spink said the software allowed Pfaudler to combine the two groups' finances into one system, even though the two used different length account numbers, different types of accounts and different accounting structures.

The firm ran the general ledger system in parallel with the two old systems during January, February and March 1984 and went live with it April 1.

After the firm had its general ledger in place, it ran tests on the fixed-assets software and brought it up in September. The accounts payable software is slated to come up later.

Because the system is still in start-up mode, Spink said, Pfaudler has yet to realize all the benefits it expects from integrated financial software — mainly reduced data entry time and financial savings. The most wide-ranging benefit to date is that the system provides a "20th-century type of technology vs. something I think was really ancient," he said.

Pfaudler is currently using the software's analysis and reporting features, for example, to help plan its budget. The firm monitors financial activity for a given period and extrapolates it to a full year. It compares its forecasts with its actual performance, its budgets with its actual performance and its budgets with its forecasts. "We certainly wanted a lot more than a system that could add up debits and credits," Spink explained.

Pfaudler keeps 40,000 master file records on the general ledger for 24 operating entities within the firm, Spink said, and the system can generate separate profit and loss statements and balance sheets for each. Such reports are generated on demand by accountants.

Both the general ledger and the fixed assets software are Millenium series products, which provide an online, real-time environment, Spink said.

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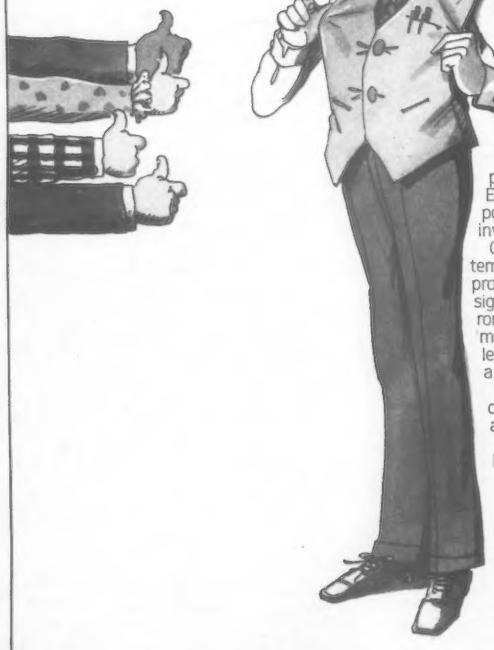

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Special Report

Options exist to deal with aging applications system

Choosing to replace or redevelop may provide cost-effective solution for firms

By Girish Parikh
Special to CW‡

The cost of maintaining aging applications systems is a nightmare for many companies. Such systems often predate the introduction of structured programming techniques and are often poorly documented. It is estimated that companies spend as much as half of their DP budgets, and from 50% to 75% of their programmers' time, on the maintenance of existing systems.

One approach to reducing the high cost of maintenance is to replace an old system with an off-the-shelf package. Another is to redevelop it. First, let us see why we should consider replacing an old system.

In addition to reducing maintenance costs, replacement of an old system can ease the migration to state-of-the-art hardware configurations and software technologies, such as fourth-generation languages and data base management systems, and produce a more responsive and modifiable system.

Cost-effective replacement

When can the replacement be cost-effective? There is no simple, generalized answer, but there are some suggestions.

To get an idea of how much software is involved, prepare an inventory of in-house applications systems. The list should include the name of the system; the name, brief description, programming language used and length of each program in the system.

If you are not already collecting program and system maintenance data, a simple maintenance log can be set up. It should include the name of the program, a change control number, a brief description of the change, the name of the programmer who worked on it and the estimated and actual time and other resources spent for the change.

Parikh is a Chicago-based consultant, lecturer and writer. His books include Techniques of Program and System Maintenance *and* Tutorial on Software Maintenance *(with Nicholas Zvegintzov, published by the Institute of Electrical and Electronics Engineers, Inc. Computer Society).*

> *Do not forget to keep in mind the intangible benefits of new systems, such as increased user satisfaction and better response to customers. New systems will also help reduce programmer turnover.*

The cost of proposed changes can be determined based on prior changes. The costing function can even be automated. Such data may help identify what programs cost the most to maintain. System maintenance costs can also be worked out by determining the total cost of program maintenance within a system.

Select the systems with high maintenance and project costs over five years. How much would they cost to replace with packages or to redevelop and maintain thereafter? If you outline the requirements of the new systems, you can find out if suitable off-the-shelf packages are available or if the systems will have to be redeveloped and then project the costs and benefits.

Any experience with installed packages and in-house development of similar systems can help in a preliminary cost/benefit study. Do not forget to keep in mind the intangible benefits of new systems, such as increased user satisfaction and better response to customers. New systems will also help reduce programmer turnover.

What issues should you consider when replacing an old system? First, search for packages that will meet most of your requirements and will run on your hardware configuration. In selecting a package, consider the ease and cost of installation and conversion, the vendor's reputation and support, the need for customizing the package and the documentation and maintenance costs. Also talk with some users.

If you decide to redevelop an existing system, estimate the costs, resources and time needed for this work.

Redevelopment usually involves high risk. If appropriate, you may consider redeveloping the system in phases.

Fortunately, there are some alternatives available to defer total replacement and reduce maintenance costs.

Identify worst code

One alternative is the so-called 80/20 rule first observed by Gerald M. Weinbert. He found that 80% of maintenance problems were found in 20% of the code. The percentages may vary, but the majority of problems are found in the minority of code. By identifying the worst code and redesigning or documenting it, you can substantially reduce maintenance costs.

Program maintenance logs described earlier can help identify the worst code.

Also consider improvements in the system such as converting front-end data entry from batch to on-line. The code can also be improved. Automated packages or services are available for renovating old systems. Several preprocessors are available for reformatting Cobol code to improve readability.

Automated documentation packages for Cobol, such as Scan/370 from Group Operations, Inc., are also available for documenting programs. Study a good software tools directory for other packages.

Automated restructuring

Another option is automated restructuring of programs. One vendor is the Catalyst Group of Peat, Marwick, Mitchell & Co., which provides service for automated restructuring of Cobol programs.

Superstructure from Group Operations is an example of a package that automatically restructures Cobol programs.

Prepare short-, medium- and long-term plans to deal with the high costs of software maintenance. Get management support for implementing the plans.

Involve users and DP staff in preparing and implementing the plans. And review the plans and progress periodically.

Forming rapport with vendor key to units' maintenance

By Linda Lancaster
Special to CW‡

What user of electronic equipment would not agree that service is essential to the proper maintenance and upkeep of electronic hardware? But how many would agree that the same holds true for their software? With the cost of servicing and maintaining the average software package approaching a hefty 85% of its total cost over time, today's wise user should be thoroughly educated in the ins and outs of available service programs and options.

Admittedly, there is an array of services available, and each user's needs are unique, but a general rule of thumb when purchasing any software package is to look for vendors that offer a full range of services and support.

This is true even if you have no intention of ever using every program or service they offer.

Only vendors who maintain a fully developed support staff and good resources will be committed to providing the kind of service you may need. Software manufacturers should offer all of the following services:

- Phone support. A toll-free number attended during business hours by specialists who can respond quickly and effectively to users' questions.
- Update service. An automatic distribution service that appears at regular intervals and keeps the user abreast of all modifications and revisions to the software package.
- On-site service. An important feature provided by manufacturers who support a broad range of services. This option allows trained specialists to isolate and identify software problems on-site. Although most difficulties can be resolved through phone assistance, on-site service provides additional backup in unusual situations.
- On-line service. Essentially an on-line library maintained and frequently updated by the software vendor, on-line service should provide software enhancements, trouble-shooting tips and new products.

Lancaster is manager of software services for Data General Field Engineering, a designer and developer of computers and software based in Westboro, Mass.

> *Because software is in constant development, form an ongoing relationship with your software vendor. Assess that relationship at purchase and determine if it will wear well with time.*

On-line services also allow fellow users to share information about the software they are using. By keeping the software user up-to-date on new developments, a properly maintained on-line service can maximize the productivity of a package.

- Remote assistance. The newest development in software service and maintenance, remote assistance lets your software vendor access and correct software problems via a communications device.

Before choosing such a service option, however, the user should analyze his security requirements very carefully. Because remote assistance allows the software vendor to access your computer system and possibly your data as well, be certain that you retain absolute control over how and when the service party gains access for maintenance.

The customer should have the option to observe and terminate the service operation. By minimizing downtime for your software vendor to service your software, remote assistance keeps your software operating at its highest level of efficiency.

Because software is not static but rather a product in constant development, you will need to develop an ongoing relationship with your software vendor. The wary software buyer should assess that relationship at the time of purchase and determine if it will wear well with time.

If a software manufacturer is willing to sit down with you and draw up a service plan that fits your needs, you are on your way to developing the kind of relationship that will maintain your software at peak productivity over its lifetime.

Special Report

Lessen the trauma of software selection — plan ahead

By Constance A. Knapp
Special to CW‡

Some simple planning can make the application software selection process easier and more effective. First of all, a project leader must be selected. This person can either be from systems or the user department; technical expertise is unimportant. The project leader must be able to manage both the project and the project team.

Once a leader is chosen, an interdepartmental, two- to 10-person task force should be established, including a representative from every department affected by the new system. This group must meet regularly, establish a schedule and work together to complete the tasks.

Once this has been done, these steps can be followed:

■ Determine exactly what the system must do. Separate the need-to-have features from the ones that would be nice to have. Feature by feature, be as specific as possible.

If there isn't time and/or staff to write a formal requirements document, then at least create a chart with the features you must have down the side, leaving room for the vendors you will be considering along the top. Agreement on what the system must do to satisfy minimum requirements must be reached now, along with whether or not modifications will be made.

As much as possible, systems should be installed without modifications. Not only will the system take longer to install, but any maintenance agreement and warranty will not cover modifications unless the vendor does them for you. Most vendors aren't interested in custom-coding system changes. A plain vanilla system is to everyone's advantage.

■ Select a vendor with a proven track record and an active users group. The users group is your forum for enhancements, changes and so on, as well as a resource of system expertise. Use published materials listing software vendors by application. Next, choose three or four companies for your initial calls. Each one should be willing to spend half a day with the project team, explaining the system features.

At the end of this first visit, the vendor should leave a list of user contacts, a contract and a full set of documentation (you may have to sign a nondisclosure agreement). The contract should go to your legal department when and if you decide to purchase from this vendor.

This allows lead time for legal review and revisions, ensuring that the contract will be ready when you are. The documentation should be reviewed by both systems and the user department. Unreadable documentation is unacceptable, no matter how good the system seems to be.

Following each presentation, the project team should determine if the vendor's product should be considered further. The result of this review may be the realization that prepackaged software is not for you. If no system can satisfy at least 80% of your requirements, you should reconsider. Either change the way you will use the system or develop a customized system.

This weeding out should leave one or two vendors. The sales representatives should now come back for a full day to explain how this system will work using your data. All remaining project team questions should be answered on this day.

■ Make a user visit without the sales representative. Users of the product not only can show you how features work but also can alert you to problems the sales representatives will gloss over. Ask how satisfied people are. If they are not satisfied, ask why.

The users you visit should be as much like you as possible in terms of volume, activity and even industry. In addition, telephone four or five users. Design a form for all visits and calls so that the same information is gathered. Questions regarding support, training and system reliability cannot be overlooked.

The project team is now ready to recommend a vendor, sign a contract and order a system. For those nonbelievers who complain that this is a time-consuming job, remember: There's never time to do it right; there's always time to do it over.

Knapp is a New York-based computer consultant specializing in the selection and installation of financial software.

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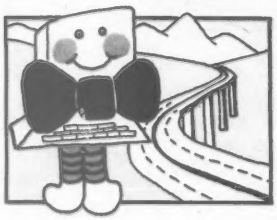

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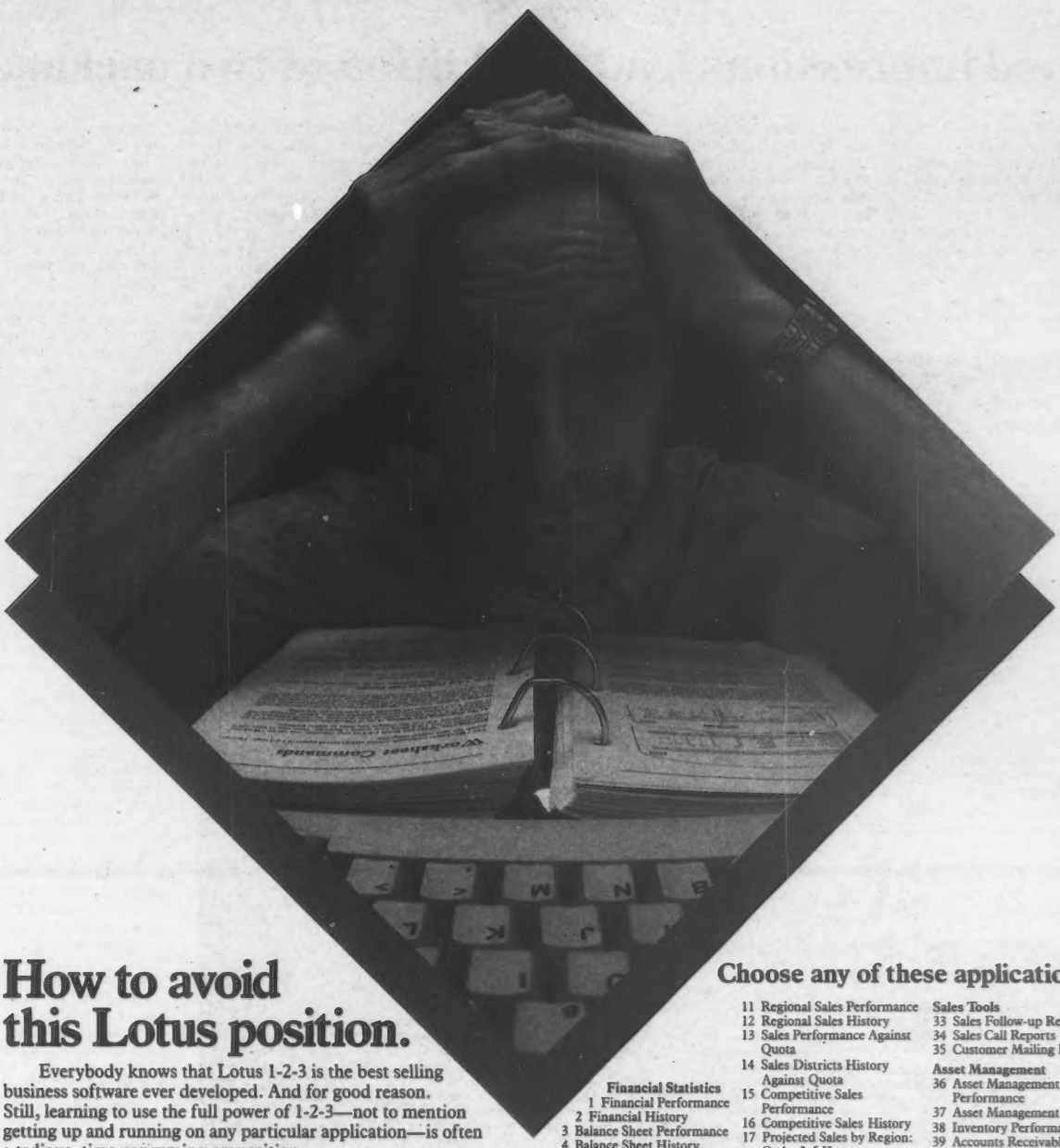

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Special Report

Good impressions lead to addition of two packages

CLEVELAND — Familiarity with a software vendor and its system architecture was a driving force behind a Fortune 500 manufacturer's recent purchase of two accounting software packages.

Midland-Ross Corp., an $850 million-per-year manufacturer of aerospace, electronic and electrical products, thermal systems and steel castings, decided early last year to buy general ledger and accounts payable systems from the same firm that supplied its fixed assets accounting software.

MIDLAND ROSS

The firm's decision to buy two new packages from Data Design Associates, Inc., whose fixed assets system Midland-Ross has used since 1980, was based heavily on two criteria, according to Jeffrey Kenney, a corporate accountant for Midland-Ross.

"From our experience with the fixed asset system, we knew that Data Design's support was excellent," he said. "Also, we were impressed with that supplier's advanced system architecture, which facilitates flexibility within the system and permits us to custom-tailor the system to suit our needs."

Kenney served as project leader for the selection and installation of the general ledger and accounts payable systems. He said he took advantage of the vendor's support during the installation and continues to rely on Data Design's help. "There have been a few minor snags from time to time," he said, "but when they occur, I get on the phone, and the developer fixes the problem or tells us what to do."

Randy Rhea, supervisor of systems and programming for the firm's corporate office, explained why the software's architecture was a second factor in the firm's choice of vendors. The software includes a data mapping file on which on-line screens are maintained, he said, and the setup allows the firm to customize screens without the need for program changes.

"As a result of data mapping," he said, "you don't have to change many lines of code to change the configuration or information on a screen. All you have to do is make minor changes to information kept on a card-image disk file."

Rhea said the decision to install three systems from the same software house was an additional advantage for Midland-Ross' data processing department. The architecture on which the packages are based uses common functional modules with similar commands for standard routines such as edit/update. Because of this, he said, "It will be relatively easy for our staff to make the transition from one package to another."

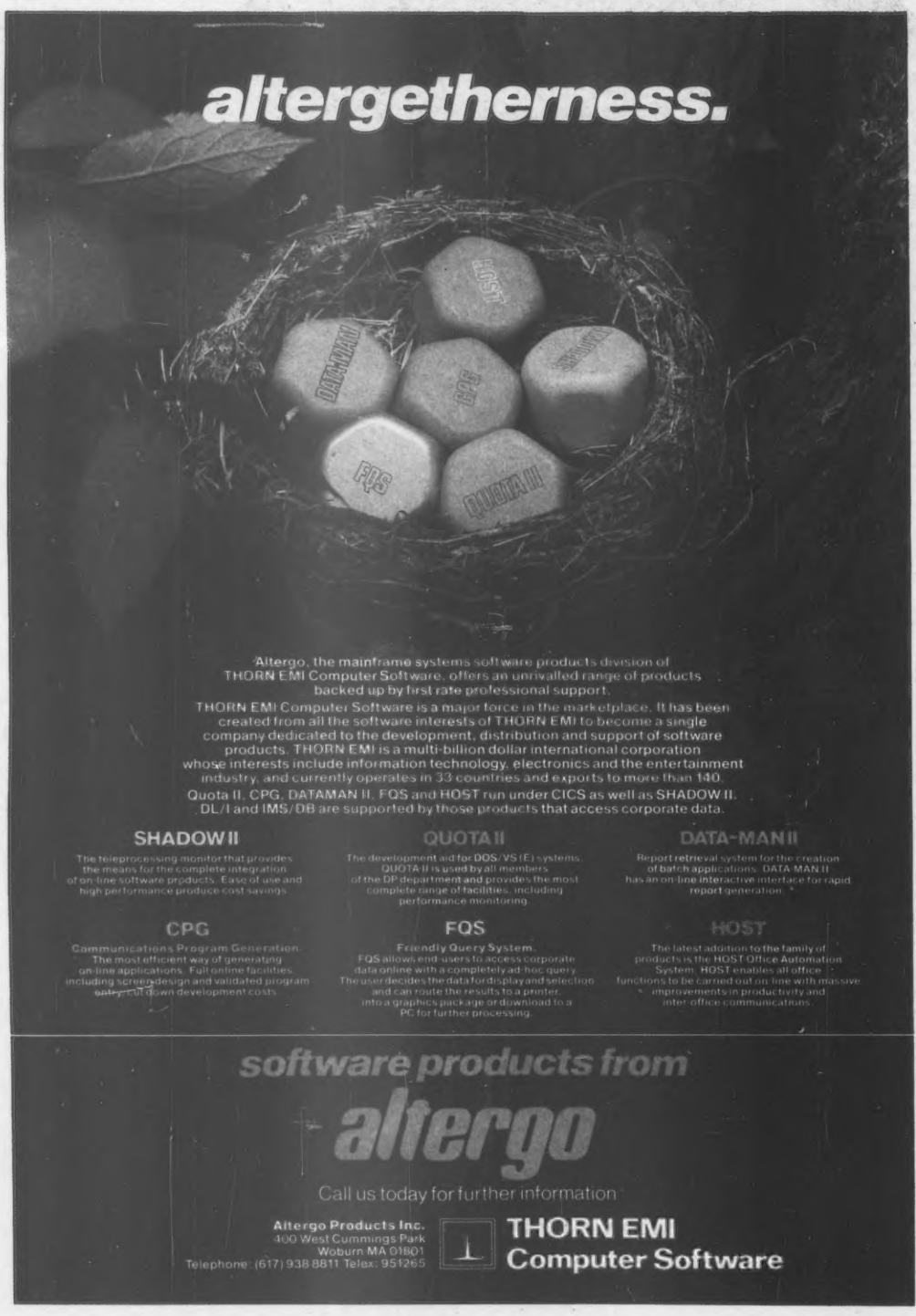
Midland-Ross installed the fixed assets accounting system in 1980 to handle the requirements of the federal government's accelerated cost recovery system, which was introduced that year.

According to Mike Atamanec, Midland-Ross' supervisor of property accounting, the system currently keeps track of approximately 38,000 assets. Those assets have a net book value of about $150 million, he said. The system gives the present depreciated value of each asset for accounting purposes. Depreciation is accrued for monthly statements.

The general ledger system, installed this summer, is being used for corporate office statements and reporting, according to Kenney. He said applications may be expanded later and eventually may include preparation of consolidated financial statements for the entire company.

Midland-Ross installed the accounts payables package in the fall and has been running tests on it. Kenney said that after it goes live this month, it will be used to pay and keep track of payables incurred by the corporate of-

See **ROSS** SR/32



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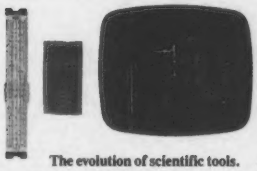

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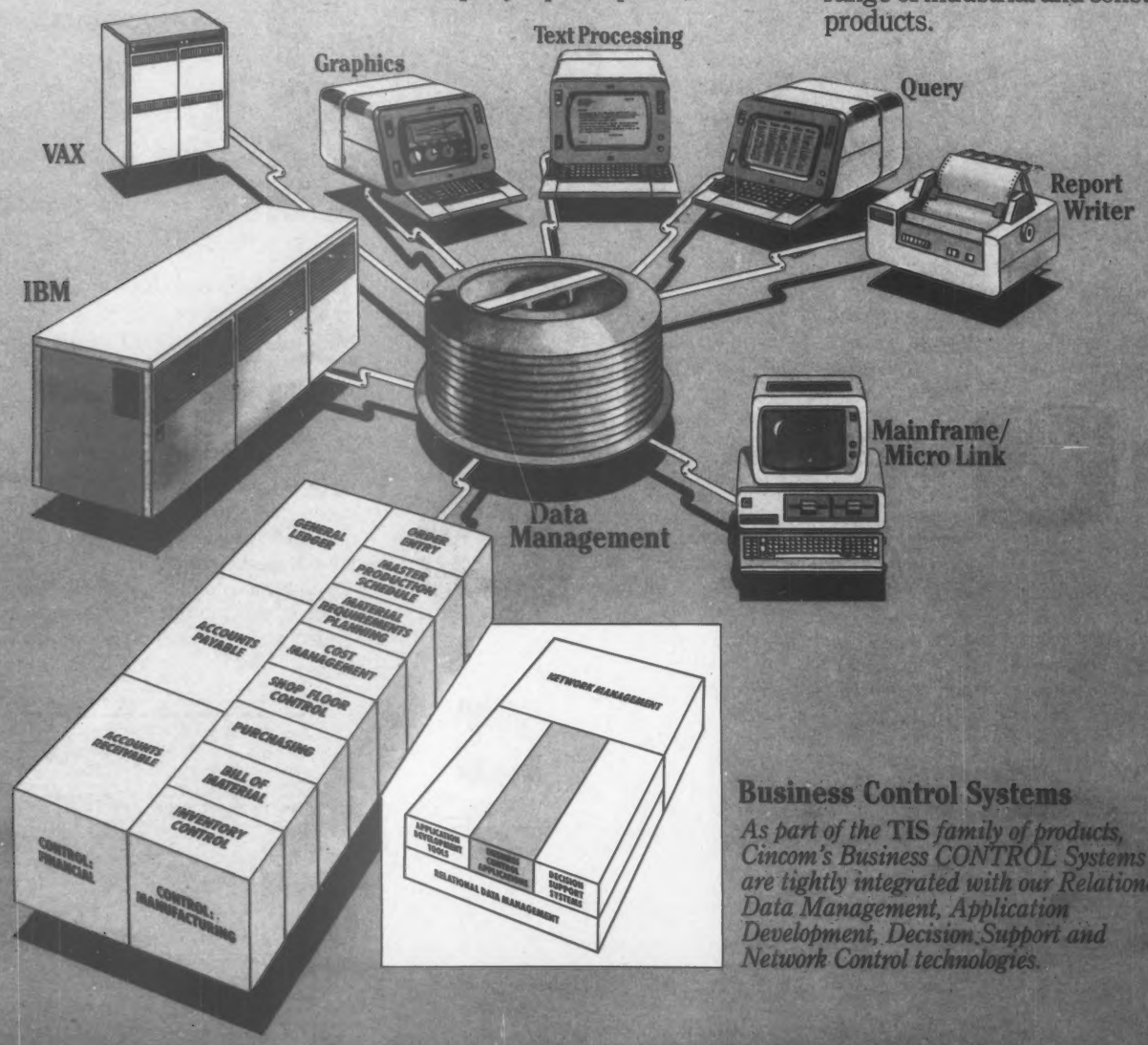

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Special Report

Cost-management software criteria key to federal bids

By Jim Maher
Special to CW‡

With the growing number of U.S. Department of Defense and Department of Energy (DOE) projects, more companies are bidding for government contracts. To be successful in the competition for government-funded work, companies have had to implement quickly cost-management applications software and systems that meet government requirements and standards for reporting project progress and spending patterns.

Maher is manager of applications development for Metier Management Systems, a Houston developer of project management systems.

> *Cost-management applications software must help a manager structure projects with an emphasis on the most up-to-date form of status reporting.*

Because the U.S. government is currently funding so many large projects and programs, companies have had to change the way that they perform cost management. Now more than ever, companies are bound by the strict requirements contained in the Cost Schedule Control System Criteria (CSCSC) issued by both the DOD and the DOE.

The CSCSC is a set of government specifications for cost reporting standards and requirements to which contractors and subcontractors working on DOD or DOE projects must strictly adhere. Although there are many government requirements for cost and schedule reporting, the CSCSC is considered to be the most comprehensive and stringent of them all.

Current cost-management applications software must help a manager structure projects with an emphasis on the most up-to-date form of status reporting. Benefits of this software include:

- Improved communications and closer client-contractor relationships.
- Increased ability to define, trace and understand problems by objective variance reporting.
- Measurable and more visible project performance.

See **COST** SR/32

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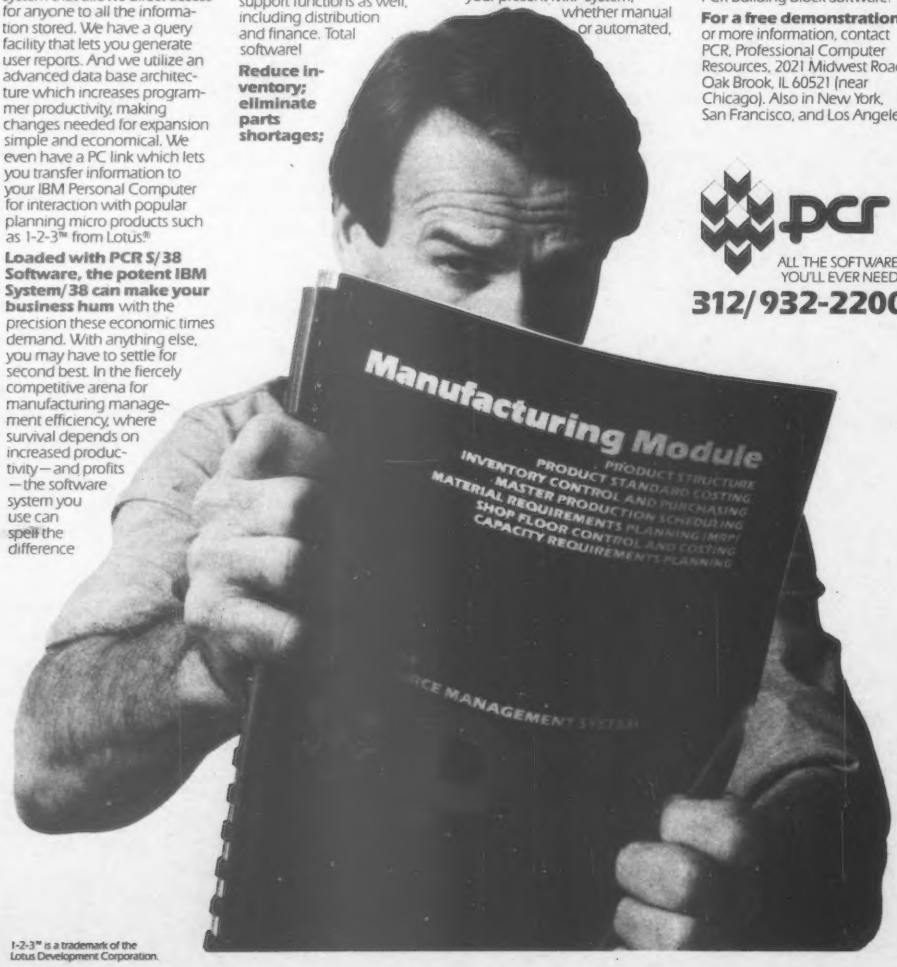

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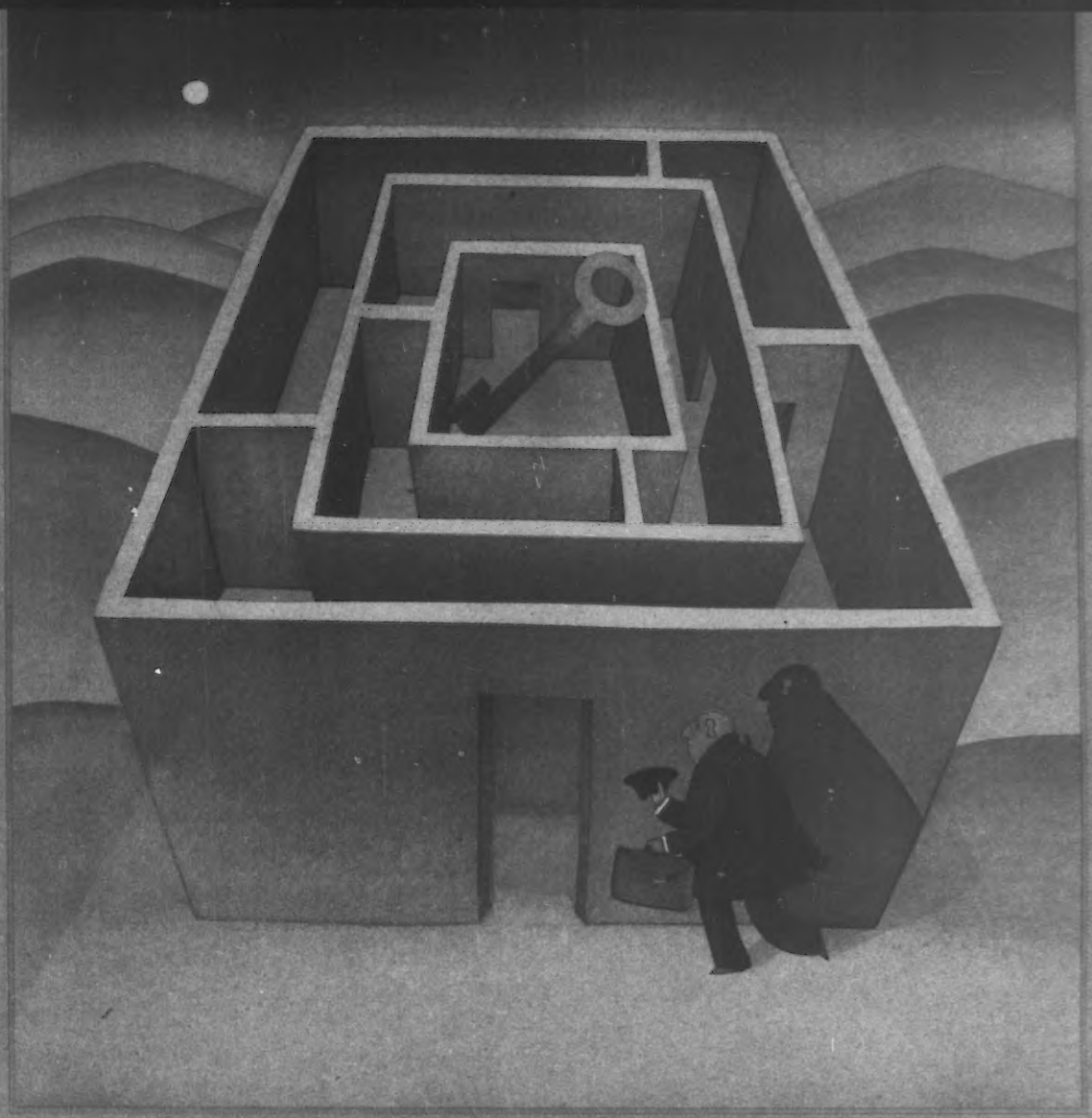
Which system should be used for software?

Much confusion exists among prospective buyers of cost applications software relating to the most appropriate hardware processing environment. In most cases, the determinant for running on micro, mini or mainframe is simply volume. However, there are other factors that do come into play.

- Mainframe. Mainframes can handle the largest volumes of data within the shortest processing time. Storage of information can be centralized providing the whole organization easy access. The drawback might be the availability of time for processing, especially during peak processing periods, and the lack of a completely secure environment for highly sensitive programs.
- Mini. The mini provides the advantage of dedicated use by the project team or cost department, and confidential information is secured. The mini is compact and mobile, allowing remote use in the field or within project headquarters. The mini can be linked with a mainframe or micro, and ample storage is available on most minis for even the largest of projects.
- Micro. There is a wide variety of off-the-shelf cost applications available for the micro. However, this is one processing environment that presents capacity and performance limitations. Along with stand-alone capabilities, some cost application packages allow use of the micro as a window into larger mini and mainframe systems. By downloading information to the micro for local processing, management has the ability to utilize desktop management review and analysis of the project status. For example, financial information may be downloaded on the micro to provide spreadsheet reports for top-level financial review.

The system you choose should reflect the complexity of the project, the volume of information to be processed and, of course, cost factors.



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Special Report

Applications package halves processing time for truck

TULSA, Okla. — A firm here that builds trucks and containers to haul anything from garbage to cows got a lift from a mainframe software package that cuts the time the company spends preparing its payroll in half.

Crane Carrier Co. builds garbage trucks with cylindrical rather than square backs because they can carry more trash; it recently designed a cattle car that stores food and water so that cows en route to slaughter houses do not lose weight when they get laid over at freight yards.

The company also owns and operates a nationwide network of 23 parts depots, which sell engines, transmissions and other parts to companies like Mack Trucks, Inc.

> *'We projected significant growth, so it was a good time to make the change.'*
>
> — Ken Martin
> Crane Carrier Co.

In the mid-1970s, Crane decided to produce specialized vehicles in addition to its customary stock — cement mixers and other trucks for construction jobs. Besides sanitation trucks and cattle cars, the firm manufactures vehicles that function as mobile oil and gas rigs, which customers can drive on-site to service their wells.

Diversification brought success, and by 1982 the company's growth prompted a system upgrade and a search for some application packages. "We projected significant growth, so it was a good time to make the change," said Ken Martin, Crane's MIS director.

Crane installed an 8M-byte IBM 4341 to supplement and eventually replace a Sperry Corp. 9080. The firm also purchased accounts payable, general ledger and payroll software packages from Management Science America, Inc. (MSA) to run on the IBM machine. It brought up those packages one at a time, finishing with the payroll, which went on-line in November 1983. MSA's Payroll System replaced a homegrown batch processing system that ran on the Sperry Univac.

For its 1,000 employees in its manufacturing plant here and depots throughout the country, Crane runs five separate payrolls:

- An executive payroll, run twice a month.
- A payroll for other salaried employees, run twice a month.
- A payroll for office workers, who are paid hourly wages, which is run every week.
- A payroll for workers in the plant, who are paid hourly, which is run every week.
- A payroll for drivers, who deliver parts and equipment where they are needed, which is run twice a week.

With the MSA software, Crane wraps up its payroll cycle, which includes entering data and producing and distributing checks, in 2½ days, according to Barbara Brannan, the firm's payroll supervisor. Under the batch system, she said, the cycle consumed about four days' work.

Payroll keys in data

Employees in the payroll department key information from workers' time cards and other documents into the system using an IBM 3278 terminal. When they are finished, they run a program that flags unusual entries with error or warning messages and shows whether the payroll information is in balance. "If there's an error, we stop running the program and get a validate listing that identifies the problem," Brannan said.

Before she authorizes the firm's data processing department to process the payroll and print employees' paychecks, Brannan corrects all the errors, checks the warnings, correcting information if necessary, and makes sure everything is in balance.

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Accounts Receivable for a clear picture of your open accounts to improve

The BMS programs work alone or as a team. You can start with one, such as General Ledger or Payroll, and add others later. Or, buy all at once. If you plan to own several, consider an IBM computer

Special Report

firm's five-part payroll system

Adelblue and some trucks from Crane Carrier Co.'s line.

Brannan explained that the checks and balances provide accuracy, which is essential to payroll processing. "You're dealing with people's income, so it better be right," she said. Employees from the manufacturing plant, for example, have called the payroll department to complain when their paychecks have been off by as little as one cent.

MSA also provides Crane with tax bulletins, which keep the payroll department abreast of tax changes as they occur.

According to Jim Adelblue, a systems analyst at the firm, the updates replace a sometimes lax system that depended on local parts depots to report state tax changes to the company's central office. Local tax agencies provided the depots with information on tax changes, he said. But "the depot might or might not make the necessary changes, occassionally resulting in a lack of compliance."

The payroll department now receives information on any tax changes directly from MSA. If the updates take up less than 50 lines of code, they are sent on paper and keyed into the system, Adelblue said. If they are larger than that, MSA sends a tape that Crane runs to update its system.

The software package also provides Crane with automatic and on-demand payroll reports. Whenever a payroll is processed, the system generates reports that list deductions that are made for state unemployment and other programs, summaries that show total state and federal tax deductions, registers that record the entire payroll and other reports.

> *'You're dealing with people's income, so it better be right.'*
>
> — Barbara Brannan
> Crane Carrier Co.

End of fiscal period

At the end of each month or quarter, Brannan keys in a code that signals the end of a fiscal period, and the system produces reports that Crane sends to state and federal tax authorities.

The payroll department also uses a feature called the Special Report Generator to put together reports by different variables, Brannan said. If the firm's managers request a list of all employees in chronological order by the date they were hired, Brannan's staff requests the variables, and the system generates the list.

Adelblue said the reporting tool and other features of the payroll system are easy to use. Any employee from the payroll department can do his own work without help from DP, he said. "All you have to teach him to do is use the terminal."

Planned additions

Crane plans to install an IBM Personal Computer in the payroll department this year to supplement the 3278 terminal, Adelblue said.

The firm plans to give the Personal Computer access to the mainframe through a Digital Communications Associates, Inc. Irma board and MSA's Peachlink software.

An interface to tie the payroll software with Crane's general ledger package and an on-line real-time module for the payroll software will be installed in the first quarter of this year.

companies with smaller numbers.

cash flow and reduce bad debt.

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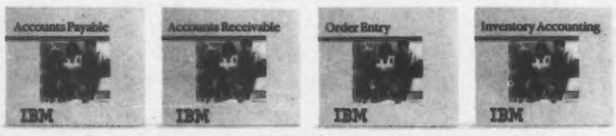

like the PC/XT. It lets you store them, permanently, inside your machine. Very handy. Here's another tip. IBM's new Personal Decision Series (for spreadsheets, writing, graphing, etc.) can take information directly from BMS. Very, very handy. And ask about IBM Extended Support, a way to get software updates and telephone assistance, direct from IBM.

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COST from SR/28

■ Increased management confidence in project information.

■ The ability to show the impact of problems such as cost and schedule deviations in dollars.

■ Accurate historical data for future project proposals.

■ The ability to forecast future cost performance based on current trends.

Wide array of packages

The company needing cost-application software must choose from a wide array of packages. Many cost-management systems use a series of interrelated application modules, and the buyer's choice becomes even more difficult when the various modules of each package are evaluated.

A recent survey distributed to users of project-management systems determined which application modules were considered to be most essential to their corporate needs. They are as follows:

■ **Organization.** This module should define the project in terms of cost accounts and cost elements using work breakdown structures and the organization breakdown structures.

■ **Budget.** The budget module must establish a time spread for the resource expenditure plan for each work increment and maintain the project performance measurement baseline.

■ **Schedule status and earned value.** This module should provide true cost/schedule integration with earned-value calculations generated from the network schedule status. In addition it must provide stand-alone milestones at the task level for automatic calculations of earned value based on milestone completions.

■ **Cost collection.** Here the application must collect direct and indirect costs from the user's system or by the direct input of actual cost.

■ **Forecast.** The forecast module should update the current project status and future performance.

■ **Estimate to complete.** This module must update the current project status and estimate future performance requirements.

■ **Analysis.** This module analyzes the data in each of the modules and performs all the summaries necessary for production of the monthly or periodic reports.

Standard reports, cost graphics and documentation modules also ranked high on management's list of module preferences.

Cost-management application systems should be flexible enough to implement a variety of modules with minimal system adjustments. Application modules should be self-contained in nature and relate to specific areas of the whole system.

User gets what he pays for

The system on which a cost-management application operates is an extremely important consideration and the user usually gets what he pays for.

This feature should enable a system to hold all applications and information in one data base, thereby allowing direct access instead of interfaces to other applications, such as planning and scheduling, which are essential to project control. These applications should also be completely menu-driven to allow the user to begin entering data immediately.

Although menu-driven applications are desirable, the chance that the user would never want to restructure a format or create a specialized cost report are remote. To allow for such flexibility, a company would be well advised to choose a cost-management system written in a user-oriented project language, which also provides application source code for development of internal cost report formats.

Don't overlook training, documentation

Two additional elements that cannot be overlooked even with off-the-shelf software are training and documentation.

The reputable supplier will provide information on how to use an application and how the application should be applied to the individual organization.

There are perhaps 50 to 75 firms in the U.S. selling systems and off-the-shelf software applications for cost management. There are many firms that can provide you with a product in your specialization, but remember that a narrow scope may not fit into your organization's overall environment. Also, remember that the cost-management system chosen should be open-ended enough to accommodate the needs of a growing project.

The prospective buyer must know and understand the present and future needs of the company as a whole.

Choose three or four vendor firms that meet the organization's requirements. Investigate the vendor's history and client base thoroughly and request demonstrations. Feel comfortable that the vendor has knowledgeable people to support your acquisition after the sale.

ROSS from SR/24

fice and to maintain detailed accounts payable and vendor histories.

The three packages run on the firm's 2M-byte IBM 4331. Each includes Data Design's spreadsheet report writer component called DD-Star that Rhea said users find particularly helpful. "You can make any kind of report you want, utilizing different formats for income statements and balance sheets for various divisions or business units of the company," he said.

According to Kenney, the firm's users needed such a report writer for their work, and its inclusion in the Data Design software was a factor in Midland-Ross' choice of vendors.

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COMMUNICATIONS

Products extend IBM cable length

Channelnet's Channelmax, Syslink boost channel length from 400 feet to 3.4 miles

NORWALK, Conn. — Channelnet Corp., a subsidiary of Data Switch Corp., recently announced two products that can be used to extend the reach of the block-multiplexed channels of IBM processors.

IBM's Bus and Tag cables, used to interface processors, disk controllers and other peripherals to one of typically 16 channels on a mainframe, cannot exceed 200 feet in length, Channelnet reported. When IBM's 3088 Multisystem Channel Communications (MCC) unit is used, that distance can be extended to 400 feet.

With Channelnet's Syslink and Channelmax products, IBM's Bus and Tag cables are replaced with fiber optics, extending the reach of IBM's block-multiplexed channels to 3.4 miles at full channel speeds. This enables processors and disk systems to be located where best suited — instead of within the previously mandated 400-ft range — and provides for applications such as high-speed file transfers that would otherwise tie up front-end communications processors.

Syslink components

Syslink is said to comprise an IBM channel interface, a microprocessor that executes and controls channel commands and diagnostic functions and a fiber-optic interface that serializes IBM parallel data, encodes it for transmission and transmits it onto the optical fiber.

Channelmax Model 1400 integrates the basic Syslink functions into an intelligent switch that is said to provide backup, recovery and data path monitoring and enables control of local and remote computers through a central command console. The smallest Channelmax switch has two input mainframe channels and four output channels, and the largest has 16 input channels and 24 output channels.

The operation of both products is said to be transparent to IBM applications that support IBM's Channel-to-Channel Adapter or the IBM 3088 MCC. Their use does not require extra memory, extra processor cycles or special applications software modifications, the company reported.

Syslink speed key to transparency

The key to this transparency is said to be the speed of the Syslink. It maintains IBM processor channel throughput speeds of 1.5M or 3M byte/sec, the equivalent of up to 27M bit/sec. To achieve these speeds, the fiber-optic link is driven at 44.74M bit/sec, which is the T3/D3 North American digital telephony standard.

An integrated systems controller is said to provide both products with centralized channel management, control that can be extended to up to 16 channels on a CPU. The systems controller monitors the channels, logs disk storage errors and displays critical status alerts. An optional channel analyzer and trace unit can be added that will sample Bus and Tag signals at 10 million times per second. These events are time-stamped and stored on the disk of an IBM Personal Computer for analysis.

Robert G. Gilbertson, president and chief executive officer of Channelnet, said that if IBM increases the maximum speed of its Bus and Tag channels to 6M byte/sec, a rumored development, the Syslink and Channelmax products would be upgraded.

Available now, Syslink costs $50,000 for a pair of adapters and a controller. The two-by-four Channelmax with one Syslink pair starts at $115,000 and goes up to $475,000 for a 16- by 24-port model.

Channelnet is located at 3530 Boston Post Road, Southport, Conn., 06490.

Rolm releases four-channel Phonemail voice message unit

SANTA CLARA, Calif. — Rolm Corp. last week announced a four-channel version of its Phonemail voice messaging system aimed at small organizations with 40 to 80 users.

The entry-level system, offering seven hours of voice storage on an internal 154M-byte Winchester disk drive, can be upgraded to Rolm's eight-channel, 300-user Phonemail system or to the top-of-the-line, 16-channel, 1,000-user system, both of which are being marketed to large organizations.

According to Rolm, the minicomputer-based Phonemail system was designed for integration with its line of private branch exchanges (PBX), connected to Rolm's CBX over a direct digital link through a line card set in the switch. This provides features not available with nonintegrated systems, such as automatic call forwarding to the user's mailbox after a predetermined number of station rings.

Rolm claims this feature encourages the use of voice messaging systems by a factor of three because, among other things, the user is not required to know the mailbox number of the person he is trying to reach.

Voice messages

The system stores and forwards voice messages and is said to feature telephone answering with a personal greeting, the ability for callers to return to the operator by pushing "0," and integration with the CBX telephony features. System users reportedly can retrieve messages through any touch-type telephone, save or delete messages, hear and annotate messages during a single telephone call and skip ahead to other waiting messages.

Message waiting notification is achieved with standard analog phones by giving the user a broken dial tone when he places a call. Rolm's proprietary phones have a visual message identification light.

The four-channel messaging system was designed for use with Rolm's smallest PBX, the CBX VS. It cannot be "cleanly" integrated with other Rolm Phonemail systems, a Rolm spokesman

See **ROLM** page 57

■ Dataflow Systems of California, Inc. has introduced an implementation of the XModem file transfer protocol for Hewlett-Packard Co.'s HP 3000/**55**

■ Pathway Design, Inc. has introduced a series of IBM Systems Network Architecture and bisynchronous gateways/**57**

INSIDE

Software/**55**
Multiplexers/ Modems/**55**
Local-Area Networks/**57**

IBM mini-based net out from Systar

SAN JOSE, Calif. — Systar Corp. has announced a networking scheme based on IBM Series/1 minicomputers that are used as X.25 packet-switching network nodes, each capable of supporting up to 15 host computers and 100 virtual circuits.

The Sonnet-Series/1 Nodal Network targets companies desiring to build their own corporate backbone networks. Each Series/1 node is designed to provide packet assembly/disassembly functions, translating data from incompatible sources into a common X.25 transmission protocol and back into a receiving protocol following transmission.

The nodes are also said to perform routing and transport functions and dynamic alternate routing in the event of line or node failure or in network reconfiguration.

Systar said that a network can include up to 945 nodes, with each node having up to four trunks for internodal packet switching.

For local network ring configurations Sonnet reportedly supports speeds of 2M bit/sec. Communications between hosts to the network nodes can be up to 19.2K bit/sec, and internodal communications can be at speeds up to 56K bit/sec. Nodal reconfiguration can be accomplished on-line without system interruption, and network control and diagnostics processes are resident in each node, according to the vendor.

Sonnet is said to allow other Systar software products to coreside in the Series/1.

Systar is selling the hardware and software package as an IBM value-added remarketer.

The starting price for a basic node is $50,000.

Systar is located at 1762 Technology Drive, San Jose, Calif. 95110.

3Com releases multifunction server

MOUNTAIN VIEW, Calif. — The 3Com Corp. has introduced a network server designed to allow personal computers connected to 3Com's Etherseries local-area network to run multiuser network applications, share peripherals and go off the network.

The 3Server contains a 36M-byte hard disk that can be shared by up to 50 network users in non-disk-intensive applications such as electronic mail. It also enables the sharing of certain network applications, such as spreadsheets and access to networked data base and accounting systems.

Additionally, the 3Server can support up to six other disks, provide a gateway to wide-area networks and double as a print server and tape backup server.

Network-based applications supported include transaction-intensive multiuser data base and accounting systems, such as Aston-Tate's multiuser Dbase II, Software Connections, Inc.'s LAN:Datastore and Business Library Corp. and Open Systems, Inc. accounting packages. About five users can be supported in these types of applications, 3Com said.

Peripherals that can be shared through 3Server include the Hewlett-Packard Co. HP Laserjet laser printer, a 60M-byte tape backup unit and up to 250M bytes of external disk storage.

Other than the 36M-byte fixed disk, the server includes an Intel Corp. 80186 chip, an 82586 Ethernet controller and 512K-byte disk cache memory.

The suggested retail price for 3Server is $7,495. Add-on 36M-byte disk drives cost $3,995. A 60M-byte tape backup costs $2,995, and an add-on 384M-byte memory option costs $995. Also, Ethershare software for shared-disk capability costs $695.

Etherprint software for sharing printing resources costs $395, and the Ethermail electronic mail software costs $995.

More information is available from 3Com through P.O. Box 7390, 1365 Shorebird Way, Mountain View, Calif. 94039.

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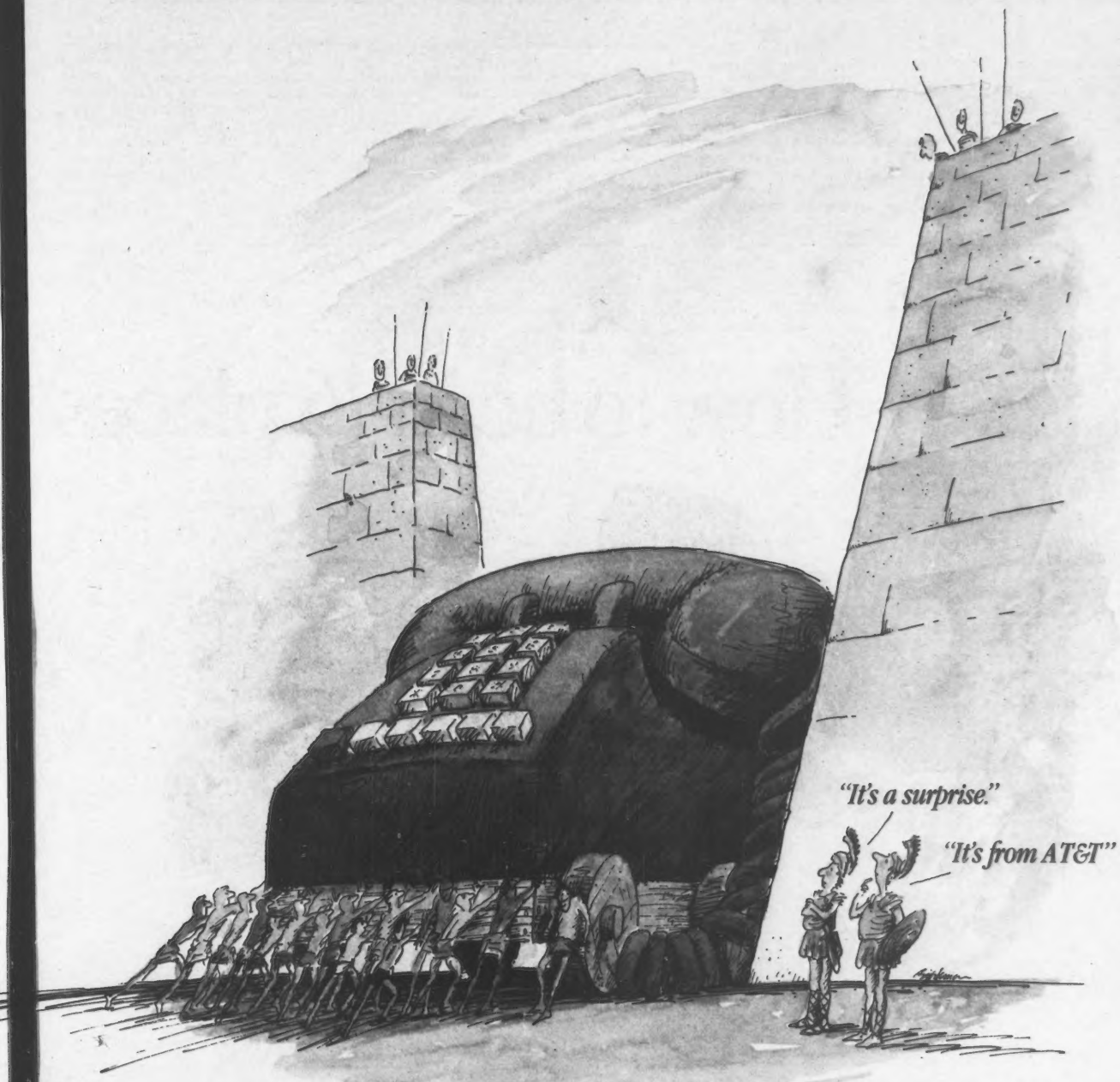

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Local Data unwraps Datalynx 3274 enhancement

TORRANCE, Calif. — Local Data, Inc. has announced a version of its Datalynx 3274 protocol converter software that features IBM Systems Network Architecture (SNA) 25th status line using IBM 3278 symbols, large-screen IBM 3278 Model 5 emulation and base or four-color terminals.

The Datalynx 3274 3.31A software is said to allow use of IBM 3278-type symbols on terminals such as the Applied Digital Data Systems, Inc. (Adds) Viewpoint/78; Lear Siegler, Inc. 1178; Esprit Systems, Inc. 10/78; and Beehive International, Inc. DM78.

The SNA 25th status line reportedly offers alpha substitution characters on other terminals. The vendor said three-digit error and status codes of an IBM 3274 controller are emulated to assist in network management.

The product supports large-screen 3278 Model 5 emulation on Digital Equipment Corp. VT100 and Data General Corp. 450 terminals and IBM 3278 Model 3 and 3278 Model 4 emulation on most terminals with 24-line by 80-char. screens, Local Data said.

The new version of Datalynx 3274 reportedly features optional echo suppression for computer-to-computer and X.25 applications. It also supports base or four-color terminals such as the Adds Viewpoint/79 and Viewpoint/60 and the IBM Personal Computer, Personal Computer AT, Personal Computer XT and PCjr, according to the vendor.

Datalynx 3274 is available in three-, five-, seven- and nine-port configurations and costs from $3,000 to $6,000, depending on the model and number of ports.

Local Data is located at 2771 Toledo St., Torrance, Calif. 90503.

AT&T offers T1.5 users circuit boost

BASKING RIDGE, N.J. — AT&T Communications has announced a service function that will enable its Accunet T1.5 Service customers to increase the capacity of their circuits from 24 channels to 44 voice-grade channels.

M-44 Multiplexing uses a technique called bit compression. The service compresses the 64K bit/sec data stream normally required for voice channels into 32K bit/sec voice channel streams without any substantial loss of quality.

M-44 Multiplexing comes in two configurations — between two AT&T central offices or between an AT&T central office and a customer's location. In the latter configuration, the customer must provide a compatible device called a low bit-rate voice unit at his location. This unit must meet the technical specifications of AT&T Communications Technical Publication 54070 (February 1984).

The price of M-44 Multiplexing is $500/mo for each use of the service function.

AT&T Communications is located in Basking Ridge, N.J. 07920.

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How to be in 16 places

COMMUNICATIONS

SOFTWARE

DATAFLOW SYSTEMS OF CALIFORNIA, INC.
XLink/3000

Dataflow Systems of California, Inc. has introduced an implementation of the XModem file transfer protocol for Hewlett-Packard Co.'s HP 3000 superminis and minis.

XLink/3000 is said to allow users to exchange text, data and files among HP 3000s and most personal computers. It costs $250 per single system license.

Dataflow Systems of California, 2465 E. Bayshore, Palo Alto, Calif. 94303.

MULTIPLEXERS/ MODEMS

CARROLL TOUCH CORP.
BI-Link and Q-Link

Carroll Touch Corp. has announced two statistical multiplexers supporting asynchronous/synchronous protocols on the same line and supporting 7- or 8-bit protocols.

The two-port BI-Link and four-port Q-Link reportedly allow either two or four terminals, respectively, to share one telephone line and a pair of modems. They were designed for full-duplex applications with leased or dial-modems and reportedly support the X.21 interface standard.

They are said to feature intelligent flow control that is switch-selectable on the terminal ports and can be set to X-on/X-off or CTS/Busy with busy high or low.

BI-Link features an aggregate data rate of up to 19.2K bit/sec, and Q-Link has a rate of up to 28.8K bit/sec.

BI-Link costs $750, and Q-Link costs $1,195.

Carroll Touch, P.O. Box 1309, Round Rock, Texas 78680.

TYMSHARE
Tymnet Models 931 and 932

Tymshare, now part of McDonnell Douglas Corp.'s Information Systems Group, has announced two modems designed for 2,400 bit/sec and 1,200 bit/sec asynchronous dial-up transmissions.

The Tymnet Models 931 and 932 reportedly can be used to implement Tymnet's 2,400 bit/sec out-dial service. The 932 is said to be autodial, enabling a host computer to connect to the Tymnet public data network and download data without an operator present.

Both modems are said to be V.22bis-compatible and to operate over ordinary dial-up lines at 2,400 bit/sec full-duplex in synchronous and asynchronous modes. They also have an automatic 1,200 bit/sec AT&T 212A-compatible fallback mode to accept data from 1,200 bit/sec or 2,400 bit/sec modems. The 931 costs $845 and the 932 costs $995.

Tymshare, 20705 Valley Green Drive, Cupertino, Calif. 95014.

BACKUS DATA SYSTEMS, INC.
Linemux

Backus Data Systems, Inc. has introduced a five-channel, switching statistical multiplexer system that is said to concentrate up to five asynchronous Ascii terminal devices over a single synchronous data link.

Linemux reportedly features channel switching, identification and password security with automatic callback, network control and management, error control and retransmission.

The switching capability permits terminal users to communicate with multiple computers or other resources to reduce the number of leased lines, computer ports and modems, according to the vendor. Linemux costs $1,545 per multiplexer, with one Linemux required at each end of the leased line.

Backus Data Systems, 1440 Koll Circle, San Jose, Calif. 95112.

See **MODEM** page 57

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MODEM from page 55

E + E DATACOMM
Modems

E + E Datacomm has released modems that are compatible with most Hayes Microcomputer Products, Inc. communications software.

The 300 bit/sec Avatex offers manual originate and manual answer modes, EIA RS-232 interface and is fully AT&T 103-compatible. The 600 bit/sec modem has low-speed and high-speed modes, is AT&T 103/113-compatible and has autoanswer and autodisconnect features. The 1,200 bit/sec modem is said to be AT&T 212A-compatible in high-speed mode and AT&T 103-compatible in low-speed mode. The modems cost $64.49 for 300 bit/sec; $99.99 for 600 bit/sec; and $299.99 for 1,200 bit/sec, the vendor said.

E + E Datacomm, 70 N. Second St., San Jose, Calif. 95113.

LOCAL-AREA NETWORKS

MICOM SYSTEMS, INC.
Instalink

Micom Systems, Inc. has announced a version of its Instalink voice/data multiplexing system, which allows users to piggyback data signals over telephone conversations.

The system includes desktop units that attach to a telephone and support a terminal at speeds up to 9,600 bit/sec and a Micom Model 4648T Central Chassis for separating voice and data signals. The Central Chassis can be connected to a computer with two copper twisted-pair wires supporting up to 128 full-duplex channels.

Instalink can be attached to Micom's Micro 600 Data private automatic branch exchange with a Micom Instatrunk480i T1 multiplexer.

A Model 4648T Central Chassis configured for 48 channels costs $3,500; the desktop Instalink multiplexers cost $250, $212.50 in quantities of 50; and Instatrunk480i sells for $1,500.

Micom Systems, 4100 Los Angeles Ave., Simi Valley, Calif. 93063.

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said, meaning that some functions would be sacrificed in the attempt to tie two or more Phonemail systems together.

The spokesman would not comment on any future plans to integrate the voice messaging system with text or other messaging systems, a promised capability of AT&T's yet-to-be-shipped voice messaging system.

The cost of Phonemail is $45,000.

Rolm is located at 4900 Old Ironsides Drive, Santa Clara, Calif. 95050.

PATHWAY DESIGN, INC.
Netpath

Pathway Design, Inc. has introduced a series of IBM Systems Network Architecture and bisynchronous gateways designed to provide multiple personal computers with communications to IBM hosts.

Netpath reportedly resides on a local-area network gateway, permitting 32 concurrent host communication sessions through value-added emulation of IBM 3270, 3770 and 2780/3780 controllers and attached devices.

Reportedly, a single Netpath gateway can support multiple users sharing a modem and common telephone lines to access different host data in remote job entry and interactive modes. Meanwhile, network users can take advantage of the local network's features.

It is said to operate with various local-area networks, including Corvus Systems, Inc. Omninet, the 3Com Corp. Etherlink, Orchid Technology, Inc. PC net, Davong Systems, Inc. Multilink and Televideo Systems, Inc. Personal Mini using Novell, Inc. Netware/S.

It is said to permit a variety of IBM Personal Computers and compatibles to communicate with IBM hosts over dial-up, leased, point-to-point and multidrop lines. The hosts include IBM 370, 3080 series, 4300, 8100 and Series 1 systems. A simple keystroke reportedly allows users to shift back and forth between a personal computer application and a host communication session.

Netpath is available for $1,995.

Pathway Designs, 177 Worcester St., Wellesley, Mass. 02181.

John Trumbull. *The Declaration of Independence*, 1786-1797. Courtesy The Bettmann Archive.

Installing a worldwide 2400bps dial line data network can save you thousands of dollars in international data communications costs. But before you put your John Hancock on a purchase order, check the facts. To be legally used in most foreign countries, today's 2400bps modems must not only comply with the V.22bis Recommendation, but must also meet dozens of additional design and performance requirements as outlined by each country. And the truth is, most don't. In fact, there is only one company whose family of V.22bis modems has been approved and accepted by *over thirty-five* foreign nations–Concord Data Systems. Concord was the first company to install a V.22bis-compliant 2400bps modem. And, with over 20,000 units in place today, Concord Data is not only the most popular name in 2400bps modems, but is the benchmark for 2400bps modem performance. For complete details on our full line of domestic and international 2400bps full duplex dial line modems, call us at (617) 890-1394 or write 303 Bear Hill Road, Waltham, MA 02154, telex 951793.

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SYSTEMS & PERIPHERALS

CDC expands Cyber systems' memory

By Tom Henkel
CW Staff

MINNEAPOLIS — Control Data Corp. has replaced its year-old Cyber 180/835, 845 and 855 processors with the Cyber 180/840, 850 and 860 models. The recently announced systems are said to offer eight times the main memory capacity and occupy 20% less floor space than the earlier models.

Using 256K-bit memory chips, the 840, 850 and 860 models offer 16M bytes to 128M bytes of main memory. Current users of the 835, 845 and 855 systems can also take advantage of the 256K-bit memory chips to expand the capacity of their systems from the previous maximum of 16M bytes to 128M bytes. A CDC spokesman said the purchase price for main memory enhancements has been decreased from $25,000 for 1M byte to $12,500 for 1M byte.

The Cyber 180/850 and 860 models offer the same internal performance as the 180/845 and 855 models they replace. The 180/840 is said to offer roughly 30% more internal performance than the 180/835 model it replaces. A dual-processor version of the 860 is also available to replace the dual-processor configuration of the Model 855, the vendor said.

Like the other members of the 180 line, the Cyber 840, 850 and 860 support both CDC's older NOS operating system and the firm's NOS/VE operating system that was announced with the Cyber 180 line last year [CW, April 30]. Users can concurrently run NOS and NOS/VE in the same processor and main memory, the company

See CYBER page 64

CDC tape unit out for Series/1

MINNEAPOLIS — In addition to unveiling three mainframe models, Control Data Corp. also expanded its Certainty family of IBM Series/1-compatible peripheral devices with the Certainty 810, a ¼-in. streaming tape subsystem.

The Certainty 810 is said to provide up to 60M bytes of formatted storage for disk backup. The subsystem includes a streaming tape drive, an attachment con-

See CDC page 64

■ Pyramid Technology Corp. unveiled a dual processor version of its 90X supermini-computer/60

INSIDE

Terminals/60
Graphics Systems/60
Board-Level Devices/64

Tandem adds storage facility

4120-V8 houses eight disk drives in one cabinet

By John Desmond
CW Staff

CUPERTINO, Calif. — Tandem Computers, Inc. has announced the 4120-V8 Disk Storage Facility, said to store up to 1.3G bytes by housing eight 168M-byte Winchester drives in one cabinet and compatible with Tandem Nonstop 1+, Nonstop II and TXP systems.

The multiple drives are said to allow eight users to make eight I/O requests to the same file, and the requests will be processed concurrently. Average seek time is 20 Msec, and average time to data is 28 Msec with latency added.

The 4120-V8 is aimed at users with large data bases who are processing high transaction volumes, said Jerry Peterson, Tandem's vice-president of product management.

The 4120-V8 Disk Storage Facility

The eight disk drives are packaged in six sq ft of floor space. The 4120-V8 features a modular design to simplify servicing, with disk drive modules said to slide in and out without disturbing cables. Each Winchester drive is sealed and has a dedicated power supply.

The cabinet has two power cords, each supplying up to four drives, allowing data to be mirrored on disks in the same cabinet to ensure data availability in the event of drive failure, the company said.

The 4120-V8 is compatible with Tandem's 4110/4111 disk drives, and no changes to application software or operating system software are required to use the V8 in place of other Tandem drives, the company said. Each cabinet measures 36¼-in. high, by 24-in. wide by 36-in. long. The empty cabinet weighs 260 lbs. and each drive weighs 37 lbs.

The minimum V8 Disk Storage Facility configuration includes the cabinet and four drives, each with a capacity of 168M bytes unformatted, 128M bytes formatted. The price for the minimum configuration V8 is $50,000, the vendor said.

Additional Winchester modules can be added in pairs, to a maximum of eight per cabinet. Each additional pair costs $20,000, the company said. The maximum V8 configuration of eight drives and cabinet costs $88,000, the company said.

Tandem Computers is located at 19333 Vallco Pkwy., Cupertino, Calif. 95014.

HARD TALK
John Desmond
CW Staff

Like Mips, Mflops measure imperfect

Millions of instructions per second (Mips) has long been assailed by vendors and users alike as being a meaningless measure of how computer systems perform. But in spite of those protests, Mips has remained popular — possibly because many users and industry followers have been unable to find a better way of easily expressing how one processor performs relative to another.

Now that scientific processors with supercomputer or near-supercomputer speeds are becoming more prominent in the industry, complaints similar to those lodged against Mips are being voiced about the technique of counting millions of floating-point operations per second (Mflops).

In theory, Mflops measures the relative speed of a scientific processor by counting the number of straight calculations — such as additions or multiplications — a CPU can carry out in a second. Typically, these calculations do not use

See MIPS page 61

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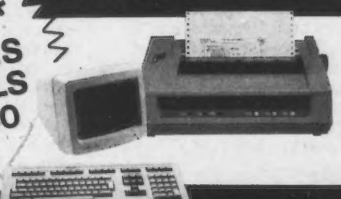

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Pyramid unwraps 90MX

MOUNTAIN VIEW, Calif. — Pyramid Technology Corp. has unveiled a dual-processor version of its 90X superminicomputer called the 90MX.

The unit is said to be an asymetrical implementation of the 90 series architecture that offers dual-processor support transparent to user programs. According to the vendor, the 90MX can offer between 1.6 and 1.8 times the performance of a single-processor 90X.

Like the 90X, the 90MX uses the firm's OSX operating system, a version of AT&T's Unix operating system that incorporates AT&T's System V and the University of California at Berkeley's 4.2.

The 90MX configuration may include 16 intelligent terminal processor ports for a maximum of 256 user connections. Also included are slots for eight memory boards that can hold a maximum of 32M bytes of main memory. Two 32K-byte data cache units, one in each CPU, are standard, the vendor said.

The 90MX ranges in price from $220,000 to $420,000. The $220,000 configuration consists of the OSX operating system, a 415M-byte disk drive, a 1,600 bit/in. magnetic tape drive, a black-and-white console, 16 user ports and 4M bytes of main memory.

The vendor is located at 1295 Charlston Road, Mountain View, Calif. 94043.

TERMINALS

TELERAY, INC.
Model 7-7305

Teleray, Inc. has announced the Model 7-7305 terminal, emulating the Honeywell, Inc. VIP7305 terminal and featuring a keyboard-selectable Ansi X3.64 Digital Equipment Corp. VT102 operating mode.

Other features include two bidirectional communications of attributes and field qualifiers, which are Honeywell VIP7200-, VIP7300- and VIP7800-compatible, on each display line.

The Model 7-7305 contains four displayable character sets for a total of 255 characters, including standard Honeywell graphics and 64 mosaics, all of which can be displayed on its 14-in. CRT. For spreadsheet applications, display memory that is normally 24 lines by 80 columns can be programmed to accept line lengths up to 255 columns long.

In addition to 113 standard Honeywell keys, the Model 7-7305 accepts up to 32 nonvolatile, programmed function sequences or control strings from the keyboard on either of its I/O ports.

The price for the Model 7-7305 is $1,695, the vendor said.

Teleray, P.O. Box 24064, Minneapolis, Minn. 55424.

GRAPHICS SYSTEMS

DATA INNOVATIONS, INC.
Expert Designer

Data Innovations, Inc. has announced the Expert Designer for producing presentation graphics from any Digital Equipment Corp. VT100 terminal connected to a DEC VAX series CPU.

The system software is said to automatically design the slide with text style, size, color and placement. Features of the Expert Designer include 864- by 576-pixel resolution, ability to produce color slides on a black-and-white monitor and correct format for 35mm slides.

The Expert Designer package includes a graphics processor board, system software, color film computer image recorder, 35mm camera back and 3¼-in. by 3¼-in. instant printback, the company said.

The company's graphics board includes an NEC Information Systems, Inc. 82720 8-bit graphics display controller and an Intel Corp. 8051 8-bit microcontroller, a spokesman said.

The price for Expert Designer 100 for use with VT100 terminals is $8,000, and the price for Expert Designer 200 for use with any RS-232 port is $8,600, the vendor said.

The products are scheduled for shipment in March.

Data Innovations, 660 Suffolk St., Lowell, Mass. 01854.

See **GRAPHICS** page 64

Value you can picture.
An important part of the Loonam difference.

Value is often pretty tough to appraise. A fair exchange; Relative worth; and Marketable price; are all descriptions that paint a vague picture of value at best. But that's not the case with the VISUAL 550 Graphics Terminal from Loonam Computer Products.

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Memorex adds 3380 emulation

SANTA CLARA, Calif. — Memorex Corp. announced that its 3864 storage subsystem now emulates the IBM 3380 disk drive and is said to off-load paging and swapping functions from the CPU.

The 3864 was formerly compatible only with IBM's MVS/SP, VM/SP and MVS/XA operating systems. Because it can now appear to the operating system as an IBM 3880/3380 disk subsystem, the 3864 is compatible with IBM's DOS/VSE as well, the vendor said.

The 3864 can work with IBM's 3030, 3080 and 4300 series processors and compatible processors. Installed units can add the 3380 emulation feature in the field, according to the vendor.

The price for 3380 emulation is $6,000 per basic storage module, the vendor said.

Memorex is located at San Tomas Central Expwy., Santa Clara, Calif. 95052.

MIPS from page 59

multiple operations such as division, nor do they involve program branching or checking. The answer is expressed in a format in which the decimal point floats.

But the hardware processing speed is only one factor in measuring performance. Software sophistication is another. Logical processing, such as IF statements or other conditional instructions, will degrade performance.

Mflops a form of hype

Mflops ratings are a form of hype. "It's my brochure vs. your brochure," said Wayne McIntyre, Amdahl Corp.'s director of special-purpose systems. "It doesn't take into account any of the things you would find in a real-world program."

While Mips and Mflops ratings are not interchangeable, they are related. Because supercomputers process multiple instructions simultaneously and not sequentially, and because they work on a tight kernel of instructions, Mips ratings would not be useful in describing their speed.

But Mips ratings on a general-purpose machine, divided by two or three, will yield Mflop potential; therefore, a 14-Mips general-purpose system may translate to a 6- or 7-Mflop supercomputer. The reason is that all general-purpose machines require multiple cycles to perform one instruction for floating-point arithmetic, McIntyre said.

"The only real way to measure box No. 1 against box No. 2 is to take a real-world job representing real-world kind of work, put it to the machines, hold things as constant as you're capable of doing and look at it in that fashion," McIntyre said.

McIntyre compares Mflop ratings to horsepower ratings in a car. "I can tell how fast a car can go by how much horsepower it has. That doesn't take into account transmission gearing, differential gearing, one seat or six seats. Horsepower is an indicator but not an all-encompassing one," he said.

Rating a 'theoretical maximum'

Art Leiz, a senior long-range planner with Grumman Data Systems, whose data centers uses Cray Research, Inc. array processors, emphasized that a supercomputer's speed depends on its instructions. He described the Mflops rating as "the theoretical maximum you can go if you have the optimum instruction."

One source said some benchmark numbers from the Los Alamos, N.M., national laboratories were 5 or 6 Mflops on a processor with a published rating of 80 Mflops. If Los Alamos scientists are not doing work close to the optimal for the machine, who is?

In fact, probably no one currently using a supercomputer is actually getting the top Mflops speed rated by the vendor. And many industry experts believe it is virtually impossible to operate a supercomputer consistently at the vendor's top-rated speeds.

Is there a better way to rate performance than Mflops? The approach of Floating Point Systems, Inc. is to use benchmark tests, performed in Fortran code by the Argonne National Laboratory in Argonne, Ill., to compare their processors with those of competitors.

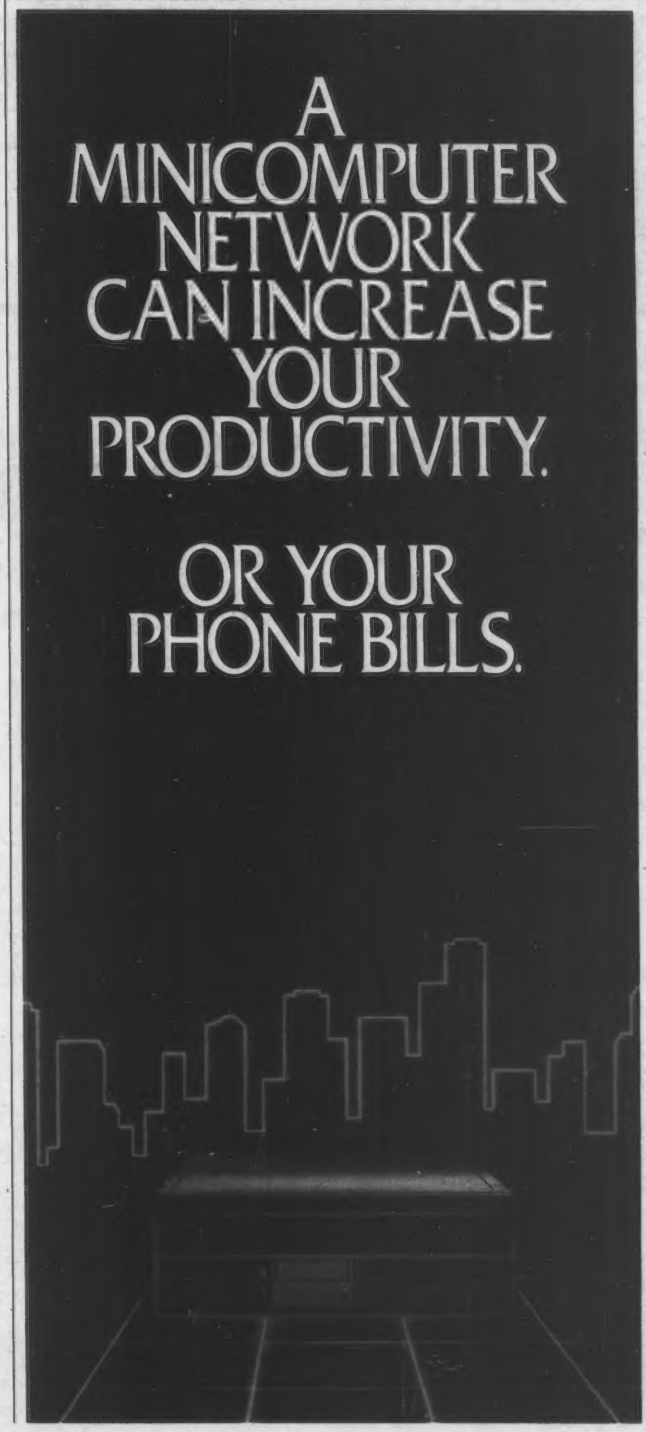
The use of a proven benchmark is clearly a better indicator of performance than a nebulous rating system like Mflops or Mips. But getting vendors to agree on a standard benchmark is often difficult. Too often, vendors insist on using the benchmark that puts their systems in the best light.

Speed only 5% to 10% rating

Leiz suggested the optimum speed most supercomputer users actually receive is really 5% to 10% of the rated speed — quite a spread. Veteran supercomputer users may be familiar with these potential spreads, but new users may be confused.

Of course, just as users are getting comfortable with Mflops, Fujitsu Ltd. in Tokyo announced the VP-400, with a reported performance of 1.066 billions of flops — or Gflops. And the goal of the fifth-generation project of Hitachi Ltd. is to produce a supercomputer that processes at speeds thousands of times faster than Mflops, yielding teraflops.

"Tera" comes from the Greek word for "monster," so we may finally be using a description appropriate for the processing power involved — monsterflops.



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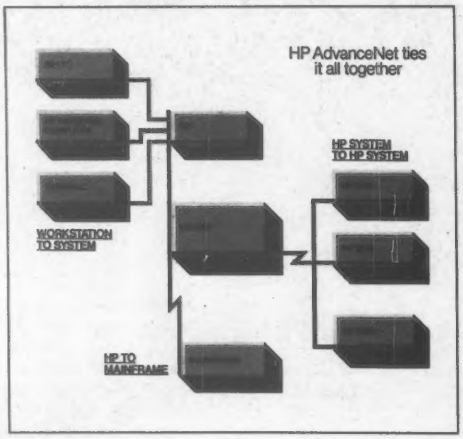

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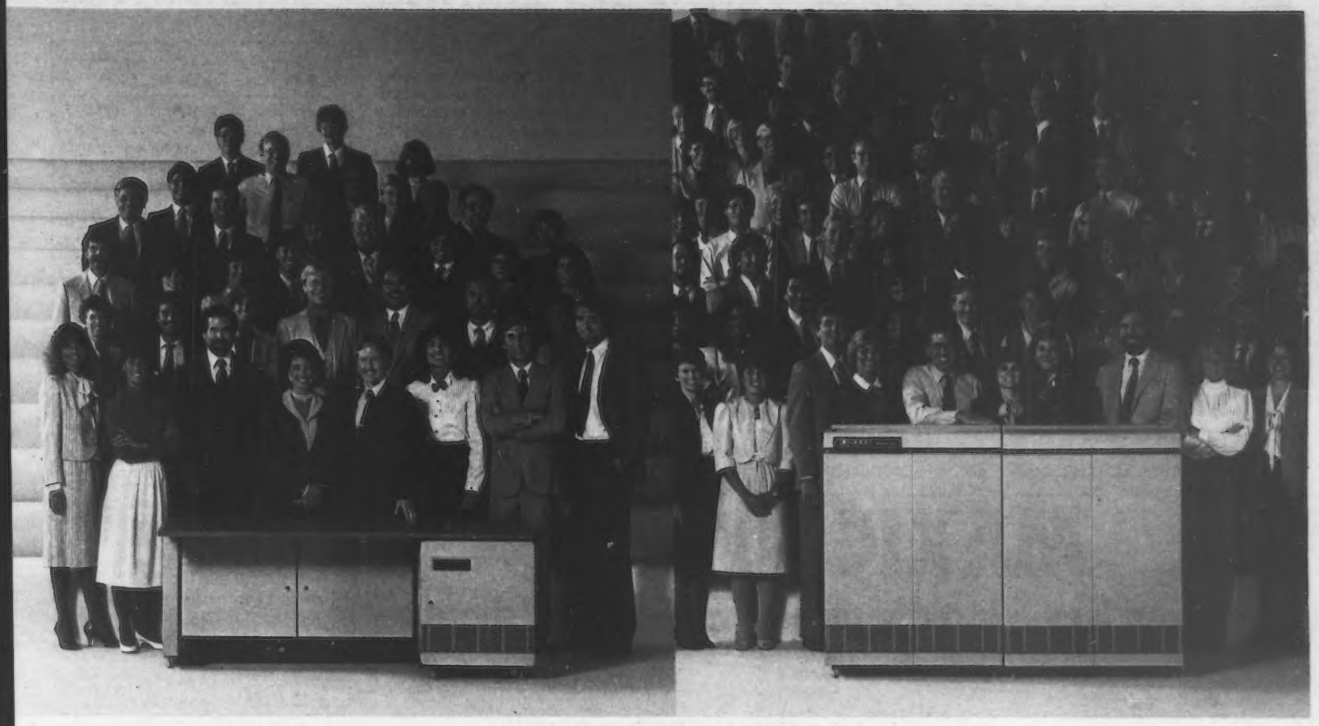

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GRAPHICS from page 60

APPLICON, INC.
Aria 19-in. color workstation

Applicon, Inc. has announced a 19-in. color engineering workstation for its Bravo! family of computer-aided design and manufacturing systems, which previously offered only a 13-in. workstation.

Based on the 32-bit Digital Equipment Corp. VAX-11/730, Aria workstations feature virtual memory architecture and color graphics display. They include software for two- and three-dimensional design and drafting tasks, as well as Conference on Data System Languages-compliant data base management capabilities, the vendor said.

Options include an Ethernet local-area communications link, cartridge tape drive, the Performance Enhancement Package for additional memory and remote Decnet communications capability.

A system configuration including the 19-in. workstation costs $90,000, and the 13-in. workstation configuration costs $80,000.

Applicon, 32 Second Ave., Burlington, Mass. 01803.

BOARD-LEVEL DEVICES

PARALLAX GRAPHICS, INC.
600 Series Video/Graphics Controller

Parallax Graphics, Inc. has announced the 600 Series Video/Graphics Controller board set, said to combine video with color graphics for a variety of applications.

The Video/Graphics Controller board is currently available for processors with Intel Corp.'s Multibus or Digital Equipment Corp.'s Q-bus or VME-bus.

The controller's video features include the National Television Standard Code I/O function, said to allow a computer to be used with a video disk player or connected to a camera or videocassette recorder.

Graphics features include a drawing processor with a 12 million pixel/sec drawing speed and a choice of 256 colors from a 16-million-color palette. The double-buffered memory displays 640 by 480 pixels out of a 512- by 1,024-pixel memory.

The controller is priced at approximately $10,000.

Parallax Graphics, 1095-E. Duane Ave., Sunnyvale, Calif. 94086.

CDC from page 59

troller that plugs into the Series/1 processor, software utility programs and the necessary hardware to attach the subsystem in a Series/1 rack enclosure, the vendor said.

The subsystem can operate in either a full disk or selective data save/restore mode. The software utilities were developed to run under IBM's EDX and RPS operating systems, according to the vendor.

For Series/1 systems that require more than 60M-byte storage backup, the Certainty 810 utilities allow multiple cartridge operation using automatic cartridge sequencing for data save/restore operations at the device, data volume or data set level, the vendor said.

The tape subsystem costs from $3,500 to $5,000 depending on quantity ordered. There is a $200/system charge for an optional tabletop enclosure. Contract maintenance is available for $45/mo.

CDC's Miniperipheral Systems is located at 2200 N. Berkshire Lane, Plymouth, Minn. 55441.

CYBER from page 59

said. Dual processor configurations of the Model 860 require that NOS/VE be used on the second processor, the vendor said.

The models each employ emitter-coupled logic circuitry and large-scale integration packaging. The systems offer an I/O unit consisting of 12 data channels and 10 peripheral processors that can operate independently and simultaneously as stored-program systems. Options can be selected to expand the I/O unit to 15 or 20 peripheral processors and 12 additional data channels.

The Model 840 is field-upgradable to the Model 850 and the Model 850 can be upgraded to the 860, according to the vendor.

The 840, 850 and 860 models including CPU, I/O units and 16M bytes of main memory cost $760,000, $1,115,000 and $1,575,000, respectively They will be available in March, the vendor said. More information is available from CDC, Computer Systems Marketing Group, HQW09G, P.O. Box O, Minneapolis, Minn. 55440.

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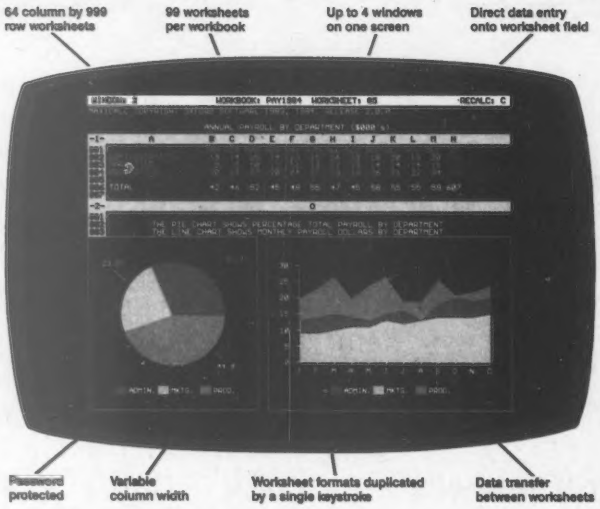

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MICROCOMPUTERS

Relief for sluggish CAD

Microcomputer-based systems expected to save time, cost for computer-aided design engineers

By Edward Warner
CW Staff

Corporate engineers who have endured slow response times on their firm's minicomputer-based computer-aided design (CAD) systems may find relief this year with the arrival of several CAD systems based on the IBM Personal Computer XT and AT.

The systems, one industry analyst predicted, could do for CAD-based engineering what stand-alone word processors did for office automation. "Graphics are the 'words' of engineers," pointed out Charles Foundyller, president of Daratech, Inc. in Cambridge, Mass.

The advent of low-cost CAD systems based on personal computers has been several years in coming, Foundyller noted. The pioneer system, Autodesk, Inc.'s Autocad, designed for use with the IBM Personal Computer, was introduced a little over two years ago.

But the arrival last year of the Personal Computer AT and an increase in the number of people who know how to write CAD software has brought forth microcomputer-based CAD systems that offer "the performance of systems costing as much as $50,000," Foundyller said.

Foremost among those personal computer-based CAD systems, he claimed, is Anvil 1000, developed by Manufacturer's Consulting Service, Inc. (MCS) of Irvine, Calif., which is scheduled to ship this

See CAD page 73

Company sprouts for introduction of MS-DOS DBMS

NEW YORK — System Automation Corp. has formed System Automation Software, Inc. to launch the Microsoft Corp. MS-DOS version of its relational data base management system (DBMS).

The system, known as Request, has produced $800,000 in sales since its release a year ago for use on Convergent Technology, Inc.-produced microcomputers, according to Alfred Rubin, president of the Silver Spring, Md., software house. The package was designed in the early 1970s as a mainframe DBMS.

The MS-DOS version of Request, demonstrated here recently, reportedly includes the following:

- Uses menu-driven rather than procedural language commands.
- Files can be used with Lotus Development Corp.'s 1-2-3, Micropro International Corp.'s Wordstar or Microsoft's Multiplan

See REQUEST page 74

Lisa conversion gets mixed reviews

Apple to phase out Lisa operating system

By Kathleen Sullivan
CW West Coast Bureau

CUPERTINO, Calif. — Managers at four companies that currently use Apple Computer, Inc.'s Lisa workstations had mixed reactions to the firm's recent announcement that it will phase out the Lisa operating system and transform the Lisa 2/10 into the Macintosh XL.

Rick Richardson, national director of microcomputer technology at Arthur Young & Co. in New York, welcomed the company's decision.

"Since Apple has provided a way that people can take advantage of the plethora of software [available for the Macintosh] and convert the Lisa documents they've been working on for a year to Macintosh files, about the only thing current users have sacrificed is a lead-in price to get into

See LISA page 73

SMALL TALK
Eric Bender
CW Senior Editor

Adapso scheme for lock and key to benefit users?

Nobody is happy with current copy protection methods for microcomputer software because the methods typically inconvenience users and do not withstand a determined attack, but some see major flaws in the effort by the Association of Data Processing Service Organizations, Inc. (Adapso) to develop a technical answer.

Adapso's Software Authorization Committee is working on a potential solution combining a lock in the software program with hardware keys held in a key ring that would attach to each personal computer's RS-232 port [CW, Jan. 21].

Once installed, the scheme would be transparent to users and very difficult to crack, proponents claim. The scheme also could ease making backup copies, simplify operations on hard-disk machines, allow a user to move from machine to machine and permit encryption and other features.

But others in the industry point to potential drawbacks. The scheme is likely to involve additional complication for the user and definitely requires new equipment (the keys and ring) that may fail or be lost. It may conflict with other technology and market trends, such as the move to distribute applications from a local-area network's file server.

And, of course, the scheme is not foolproof. In it, "there exists a ROM [read-only memory] that would run all copies of [Lotus Development Corp. software]," noted Brian Boyle, an analyst with Gnostic Concepts, Inc. "All somebody would have to do would be to duplicate that ROM, and somebody's going to sell the

See PIRACY page 74

■ Opus Systems has introduced a coprocessor that converts IBM Personal Computers into Unix workstations/**66**

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MICROCOMPUTERS

Opus coprocessor converts IBM micro to 32-bit Unix workstation

LOS ALTOS, Calif. — A coprocessor designed to convert an IBM Personal Computer into a 32-bit Unix workstation has been introduced by Opus Systems.

The Opus516 Personal Mainframe reportedly offers a complete port of AT&T's Unix System V along with a 32-bit coprocessor for the Personal Computer. It allows people running software programs on larger machines to bring them to the desktop level, Opus said, adding that Personal Computer applications can still be used with the product in place.

A single keyboard command allows users to toggle between Unix and IBM's PC-DOS, according to the vendor.

Opus516 reportedly uses the National Semiconductor Corp. 32016 CPU, with both memory management and floating-point options. The onboard memory of the Opus516 is said to be expandable to 2M bytes.

Also included with Unix System V and its utilities are C language and Fortran 77 compilers, an assembler and a debugger.

A 1M-byte system with all utilities is priced at $5,230.

Opus Systems is located in Suite 120, 960 San Antonio Road, Los Altos, Calif. 94022.

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SOFTWARE

GENERAL PHYSICS CORP. J/T PAK

General Physics Corp. has introduced J/T PAK, a job/task analysis package for the IBM Personal Computer.

J/T PAK is a menu-driven data base that reportedly guides a user through the job/task analysis process. The product is said to enable users to develop a list of elements for each task, maintain a data base of up to 320,000 statements and store lists of terminal and enabling objectives, a company spokesman said.

J/T PAK runs on the IBM Personal Computer with 192K bytes of random-access memory, a floppy disk drive, 80-col. color or monochrome monitor and printer. J/T PAK is priced at $6,000; the Job Analysis Software program can be purchased separately for $2,500.

General Physics, 10650 Hickory Ridge Road, Columbia, Md. 21044.

LATTICE, INC. LMK

Lattice, Inc. has announced LMK, an automated production generation utility that works under Microsoft Corp.'s MS-DOS operating system.

With the product, once a user specifies relationships of system pieces (source modules, object modules or chapters of a document) in a dependency file, a single LMK command initiates automatic rebuilding of the system, the vendor said. LMK reportedly can perform any executable command, such as invoke a batch text editor to make replacements in a number of files, update a data base or run a utility.

The product requires an Intel Corp. 8088, 8086, 80186 or 80286 microprocessor, MS-DOS 2.0, 128K bytes of random-access memory and a 320K-byte disk drive.

LMK costs $195.

Lattice, P.O. Box 3072, Glen Ellyn, Ill. 60138.

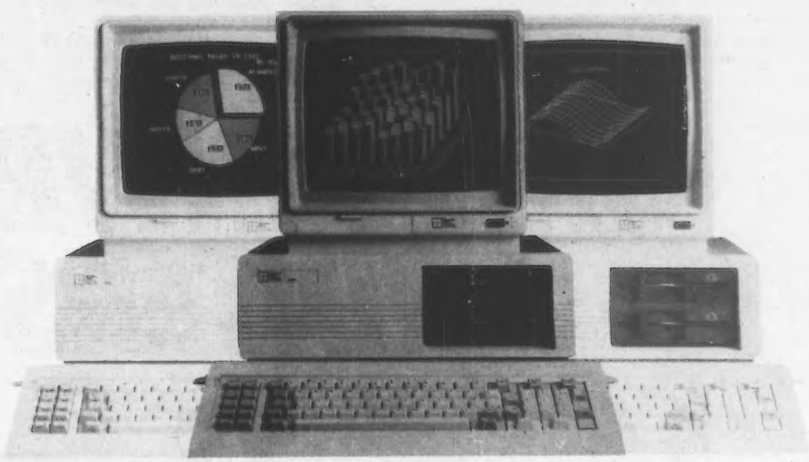
SCIENCE RESEARCH ASSOCIATES, INC. Using IBM Displaywrite 2

Science Research Associates, Inc. (SRA) has announced Using IBM Displaywrite 2, an interactive tutorial for secretaries.

The 20-hour, two-volume course

Continued on page 68

INTRODUCING DECISION DATA'S DUAL-PURPOSE COMPUTING WORK STATION



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Continued from page 66

provides hands-on training for a Displaywrite 2 user with an IBM Personal Computer, the vendor said. The first volume reportedly teaches how to create, print, revise, format and paginate simple documents. The second volume explains how to merge text, use a spelling checker and format diskettes, according to the vendor.

The course is divided into 40-minute lessons and includes two handbooks, an administrative guide and four training diskettes.

The course costs $250.

SRA, 155 N. Wacker Drive, Chicago, Ill. 60606.

LANGUAGE RESOURCES, INC.
PC-68K

Language Resources, Inc. has introduced its PC-68K plug-in CPU board for use by the IBM Personal Computer in development and debugging of code for the Motorola, Inc. 68000 CPU.

The PC-68K reportedly provides a symbolic debugger, a linker/locator, a Motorola-compatible macro assembler and an Institute of Electrical and Electronics Engineers floating-point package. It is said to offer host communications utilities, emulator communication and Pascal and C compilers.

The PC-68K costs $2,995 with 256K bytes of random-access memory (RAM), $3,595 with 512K bytes of RAM and $4,195 with 1.2M bytes of RAM.

Language Resources, 4885 Riverbend Road, Boulder, Colo. 80301.

MICRO-SYSTEMS SOFTWARE, INC.
M-Edit

Micro-Systems Software, Inc. has introduced its M-Edit tool for full screen editing on the IBM Personal Computer.

M-Edit reportedly offers display of up to eight windows, data transfer between windows and block copy/block move functions. It is said to be useful for creating batch files and working with Ascii data files.

Each of its windows reportedly has a 64K-byte text buffer, depending on system memory. Text lines may be up to 240 characters long, the vendor said. The tool also is said to offer global search and string-change functions and to support hanging indents. Its edit-mode functions reportedly include line and block operations and line-only operations.

M-Edit is priced at $199.

Micro-Systems Software, 4301-18 Oak Circle, Boca Raton, Fla. 33431.

STRUCTSOFT, INC.
PCSA

Structsoft, Inc. has introduced PCSA, a structured analysis tool for the IBM Personal Computer.

PCSA reportedly is an intelligent graphics editor that permits the production of leveled data flow diagrams of structured specifications. It also reportedly can draw data flow diagrams and check capabilities to assure consistency of specifications.

PCSA also runs with a high-resolution, bit-mapped display and will work in conjunction with a mouse, the vendor said. The software is said to offer an object-oriented, pop-up menu and to move objects around by dragging.

PCSA costs $895.

Structsoft, 24 Homer St., Parsippany, N.J. 07954.

BRADFORD INFORMATION SYSTEMS
Interactive Distribution Planning System

Bradford Information Systems has announced that its Interactive Distribution Planning System (IDPS) is available for the IBM Personal Computer XT.

The package reportedly allows a user to solve truck or vehicle routing problems on a daily or a weekly basis. It is said to provide the best locations for distribution centers, assigns distribution centers to customer locations and calculates the distance between any two points in a data base.

The product requires 512K bytes of random-access memory, IBM's PC-DOS operating system and an Intel Corp. 8087 microprocessor.

IDPS costs $10,000, the vendor said.

Bradford Information Systems, P.O. Box 73111, Houston, Texas 77090.

ZYLAB CORP.
Zyindex Plus

Zylab Corp. has introduced Zyindex Plus and enhanced its other Zyindex software for the IBM Person-

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al Computer.

Zyindex Plus, also for the Personal Computer, reportedly was designed for heavy users of textual information and provides full text search in up to 15,000 files. It is not copy protected and is licensed for up to five networked or multiuser workstations, Zylab said.

Zyindex Professional, Release 1.3, now offers the ability to handle 5,000 files. Zyindex Standard, also at Release 1.3, can now handle 500 files, the vendor said.

Zyindex Professional is priced at $295, Zyindex Standard at $145 and Zyindex Plus at $695.

Zylab, 233 E. Erie St., Chicago, Ill. 60611.

SUPERIOR SOFTWARE CORP.
Superior Mod/Com

Superior Software Corp. has announced Superior Mod/Com, a communications package that runs under AT&T's Unix or Microsoft Corp.'s Xenix.

The package features error checking and recovery and is compatible with Xmodem protocol, the vendor said. When sending or receiving files, the user reportedly can choose to send one file, several files or all files in batch mode.

In terminal emulation mode, a user can save a conversation in a file, send predefined strings by pressing one key and display user notes, according to the vendor.

The product is available for $495 for a perpetual license or for $150 for the first year and $99 for each additional year.

Superior Software, Suite 206, 202 13th St., Augusta, Ga. 30901.

LOGICAL SOFTWARE, INC.
Softshell

Logical Software, Inc. has introduced versions of its Softshell, a user interface to the AT&T Unix operating system, for the IBM Personal Computer XT under IBM's PC/IX, the IBM Personal Computer AT under PC Xenix, the Digital Equipment Corp. Professional 350 under Venturcom, Inc.'s Venix and the NEC Information Systems, Inc. APC-II under NEC's PC-UX.

Softshell reportedly consists of three programs. Yelp provides structured help information and templates for Unix commands while LSLS, a directory walk program, clarifies the Unix file system, Logical Software said. Lshell, a full screen scroll handler, permits reviews of terminal sessions and other functions, the vendor added.

Softshell is priced from $295 to $995, depending on the CPU in use.

Logical Software, 17 Mount Auburn St., Cambridge, Mass. 02138.

STOK SOFTWARE, INC.
Backrest; Stok Pilot

Stok Software, Inc. has introduced a feature for its Backrest hard-disk backup program and an enhanced version of its Stok Pilot software. Both programs are available for the IBM Personal Computer and computers running under Digital Research, Inc.'s CP/M operating system.

Backrest now features the ability to allow users to upgrade Microsoft Corp.'s MS-DOS 1.0 to MS-DOS 2.0 hard-disk formats. Backrest is said to split and merge files while they are being copied back to a disk that has undergone a reformatting.

Backrest reportedly runs on machines under Microsoft's MS-DOS; IBM's PC-DOS; Digital Research's Concurrent CP/M, CP/M 2.2, CP/M Plus, MP/M, MP/M 86 and CP/M 86; and Software 2000, Inc.'s Turbo-DOS.

Stok Pilot reportedly allows existing programs to be tied into a menu-driven structure, and systems designers may use it to add tutorials to their applications. It runs on the MS-DOS, CP/M 86, PC-DOS and Concurrent CP/M operating systems.

Backrest costs $180. Stok Pilot is priced at $200, the vendor said.

Stok Software, 17 W. 17th St., New York, N.Y. 10011.

See TOOLS page 70

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TOOLS from page 69

VANCE INFO SYSTEMS
CD Tracker

Vance Info Systems has introduced a certificate of deposit (CD) tracking and marketing system designed for savings and loan associations, banks and money brokers. The package runs on IBM's Personal Computer and Personal Computer AT under IBM's PC-DOS or Microsoft Corp.'s MS-DOS and requires Ashton-Tate's Dbase III software.

The system is said to feature document preparation, management production reports, cash flow management aids, CD tracking and analysis tools, investor analysis and marketing tools.

The package is priced at $6,000.

Vance Info Systems, 2818 Clay St., San Francisco, Calif. 94115.

VERSATILE BUSINESS SYSTEMS
Job Cost, Billing and Summary Programs

Versatile Business Systems has introduced its package of Billing, Job Cost and Summary Programs for the Apple Computer, Inc. Apple II, Apple IIe and Apple IIc personal computers.

The billing portion of the software accumulates charges for invoicing at any time, while the job cost portion will accumulate costs by job or operation, Versatile Business Systems said. According to the vendor, the job cost program will accumulate time or charges by client for professional services performed.

The package is priced at $295.

Versatile Business Systems, P.O. Box 270, Sioux Narrows, Ont., Canada P0X 1N0.

SYSTEMS

MANUFACTURING AND CONSULTING SERVICES, INC.
Anvil-1000MD

Manufacturing and Consulting Services, Inc. has announced that the Anvil-1000MD computer-aided design and drafting system for the IBM Personal Computer AT and Personal Computer XT now has interfaces for use with eight plotters from four manufacturers. The Anvil-1000MD system is said to feature 640- by 480-pixel resolution, 32 colors and support for points, lines, ellipses, conics, splines and arcs.

The product now supports Hewlett-Packard Co.'s 7470A two-pen A-size, 7475A six-pen B-size, 7580B eight-pen D-size, and 7585 eight-pen E-size plotters; Houston Instrument, Inc.'s DMP-41 and DMP-42 one-pen, D-size plotters; and Nicolet Zeta Corp.'s eight-pen, B-size plotter, the company said.

The complete Anvil-1000MD system, including the IBM Personal Computer AT and Professional Graphics Controller and Display, sells for $15,885. The Anvil-1000MD software alone costs $2,995.

Manufacturing and Consulting Services, 9500 Toledo Way, Irvine, Calif. 92718.

COMMUNICATIONS

NORTON-LAMBERT CO.
Lync telecommunications software

Norton-Lambert Co. has introduced its Lync telecommunications software for the Data General Corp. DG/One portable personal computer.

Working with the DG/One's internal modem, the Lync software is said to allow users to send and receive telexes and electronic mail and to access and exchange information with data base services. Users also can transfer data between two computers with different operating systems and disk formats, the vendor said.

The Lync program is said to contain logon modules for telex and electronic mail services. It offers macro modules that users may customize.

Lync is priced at $195.

Norton-Lambert, P.O. Box 4085, Santa Barbara, Calif. 93140.

AST RESEARCH, INC.
AST-5251/11

AST Research, Inc. has introduced a hardware/software communications package said to enable an IBM Personal Computer, Personal Computer XT, Personal Computer AT or compatible system to emulate an IBM 5251 Model 11 display station for local interactive communications with IBM System/34, System/36 or System/38 minicomputers.

The AST-5251/11 also is said to enable an inexpensive printer linked to the Personal Computer to emulate an IBM 5256 printer without changes in the host's operating system. The package consists of a microprocessor-based connection board and Model 11 emulation program.

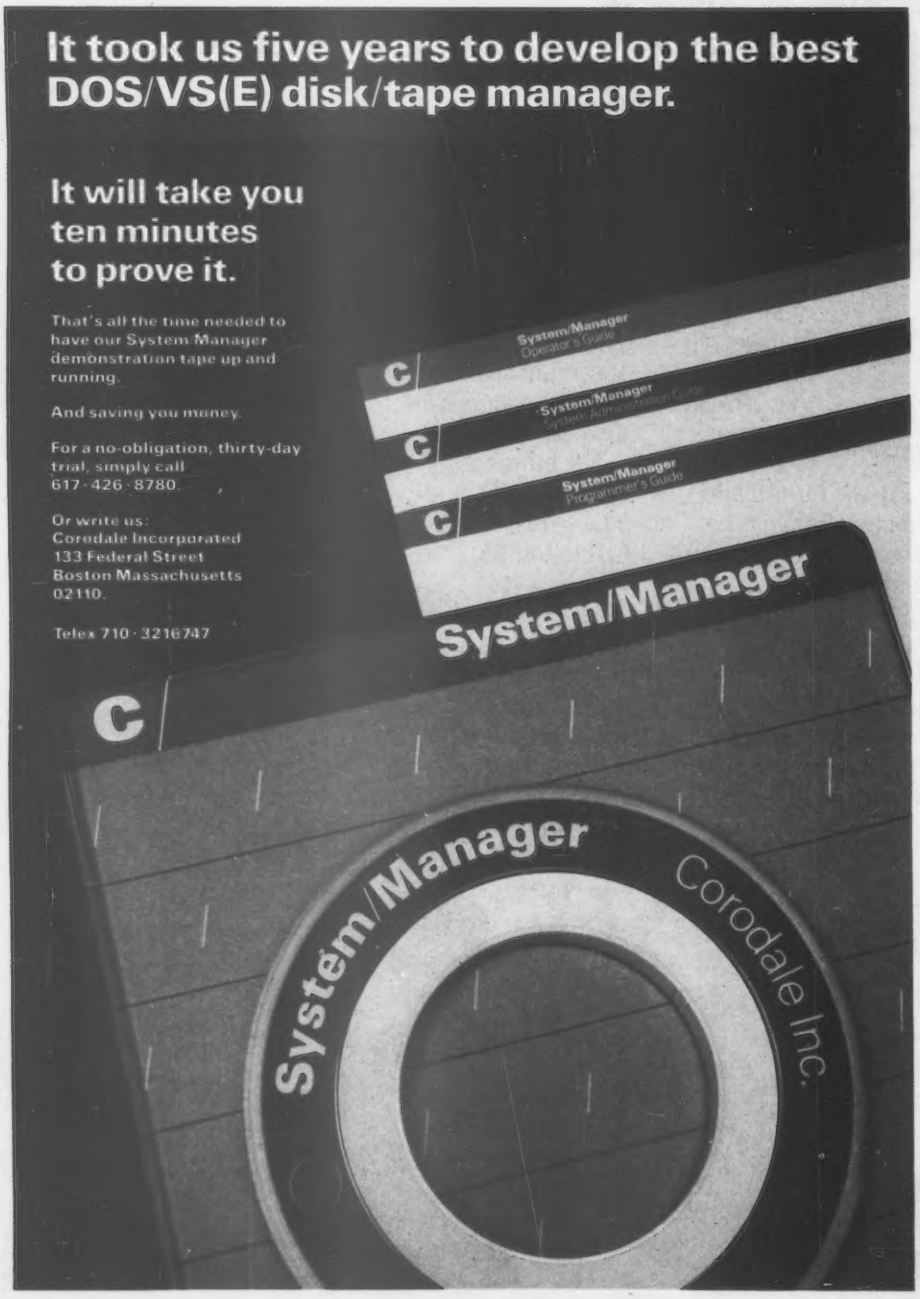
The AST-5251/11 features as standard hardware an Intel Corp. 80305 microprocessor to provide control of the line protocol, buffer management and interface with IBM personal computers; one user-selectable direct memory access channel for Personal Computer XT and Personal Computer AT compatibility; one selectable I/O interrupt channel; and a Twinax cable assembly supplied by the vendor.

The package is designed to run on IBM PC-DOS 2.0 or above, the company said. Other system requirements include 128K bytes of random-access memory, one standard IBM Personal Computer expansion slot, diskette adapter and one disk drive, a monochrome or color/graphics display adapter and a color or monochrome monitor.

The price for the package is $995.

AST Research, 2121 Alton Ave., Irvine, Calif. 92714.

See TALK page 72



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TALK from page 70

INNOVATIVE ELECTRONICS, INC.
PC-80

Innovative Electronics, Inc. has announced a plug-in expansion board designed to link the IBM Personal Computer to an IBM mainframe.

The PC-80 reportedly attaches a Personal Computer or Personal Computer XT to an IBM 3274/3276 cluster controller or an IBM 4331 Display/Printer Adapter using standard Type A connections. It is said to support IBM Systems Network Architecture/Synchronous Data Link Control and Binary Synchronous Communications.

The PC-80 lets the Personal Computer or Personal Computer XT appear to the cluster controller as an IBM 3278 Model 2, 3 or 4 monochrome display station, the vendor said. With a color screen, the Personal Computer XT reportedly appears as an IBM 3279 Model 2A, 2B, 3A or 3B.

The PC-80 cost $895.

Innovative Electronics, 4714 N.W. 165th St., Miami, Fla. 33014.

EMULEX CORP.
Persyst DCP-88/VM

Emulex Corp. has announced a distributed communications processor board with expanded memory for the IBM Personal Computer, Personal Computer XT, Personal Computer AT and compatibles.

The Persyst DCP-88/VM is an expanded-memory version of Emulex's DCP-88, a single-board, front-end processor for Personal Computers and compatibles. The DCP-88/VM can be used with a variety of software packages to emulate both Systems Network Architecture and Bisynchronous 3270, 2780/3780 and Hasp protocols, the vendor said.

Based on Intel Corp.'s 8088, the board reportedly can support up to four multiprotocol communications lines and a high-speed parallel printer port.

The board is available in dual-ported, random-access memory configurations of 64K, 128K, 256K and 512K bytes. It operates with the vendor's Persyst PC/3270SC SNA cluster and PC/3270BC bisynchronous cluster applications software for IBM 3270 terminal emulation as well as Emulex's Persyst PC/Hasp and PC3780 software.

Persyst DCP-88/VM is priced at $695.

Emulex, P.O. Box 6725, 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

INTELLUTION, INC.
ICM-4

Intellution, Inc. has announced ICM-4, an industrial communications processor for the IBM Personal Computer.

The product fits into a single-slot communications board and provides serial communications between an IBM Personal Computer and data acquisition subsystems, data loggers, programmable controllers and distributed controllers, the vendor said.

ICM-4 features 8K bytes of memory, a Zilog, Inc. Z80 microprocessor, 32K bytes of erasable programmable read-only memory and support for transmission rates between 300 and 19.2K bit/sec. It is priced at $1,595.

Intellution, 35 Perwal St., Westwood, Mass. 02090.

OSM COMPUTER CORP.
Zeusmate

OSM Computer Corp. has announced Zeusmate, an intelligent, diskless workstation for local-area networking applications.

According to a spokesman, Zeusmate was designed for network interfacing with OSM Computer's Zeus microcomputers and is IBM Personal Computer-compatible.

It is equipped with an Intel Corp. 8088-2 microprocessor and an optional Intel 8087 coprocessor. Zeusmate also features an optional 5¼-in. floppy disk drive for local storage.

Zeusmate comes standard with 256K bytes of random-access memory, an 8K-byte erasable programmable read-only memory, one Personal Computer-compatible parallel interface, three expansion slots, 80-char. by 25-line monochrome video logic with graphics capability, a 12-in. monochrome monitor, a Personal Computer-compatible keyboard and Microsoft Corp.'s MS-DOS 2.11 operating system.

Zeusmate is priced at $1,495.

OSM Computer, 665 Clyde Ave., Mountain View, Calif. 94043.

LISA from page 65

the market.

"Apple has tailored the Lisa hardware to what's happening in the real world of software development," he said.

Mario Alarcon, manager of planning integration and systems development at Los Angeles-based Northrop Corp., which designs and manufactures aircraft, said that although he expected a smooth transition to the Macintosh operating system, some users might experience problems.

"I'm still a little concerned that the way you work in Macintosh is different enough from the integrated packages [7/7] on the Lisa side that it will cause culture shock with our users," he said. Additional training may be needed to help users make the transition, he added.

Rick Wohleberg, manager of systems development at Rockwell International Corp.'s Collins Transmission Systems Division in Richardson, Texas, said Rockwell's users were satisfied with the Lisa's integrated software programs. He said he was worried that Lisa users might be asked to give up functionality when they change to the Macintosh operating systems.

He said the Lisaproject program was a "bit stronger" than Macproject and that Lisacalc was "much easier to use" than Microsoft Corp.'s Multiplan for the Macintosh.

"I would hate to see a situation develop where the level of software on the Lisa had to be downgraded in any way to satisfy Apple's phaseout of the Lisa operating system," he said.

Joel Eide, micro specialist at Winnebago Industries, Inc. in Forest City, Iowa, also said the Lisa's 7/7 package met his firm's needs. "So the ability to switch from Lisa documents to Macintosh documents might not be that important for us," he said.

CAD from page 65

month. Anvil 1000 is priced at $2,995 and reportedly offers side and rotational viewing of images, two-dimensional drawing, a library of stock CAD images and the ability to store images consisting of up to 20,000 components. It can store 300 drawings on a 20M-byte hard disk and runs on the Personal Computer XT and the enhanced version of the Personal Computer AT, both with the optional IBM Professional Graphics Display and math coprocessor, the vendor said.

Anvil 1000 uses a similar menu and offers many of the same features as Anvil 4000, the minicomputer-based CAD software for which MCS is best known, said Ross Stoutenborough, MCS's director of marketing. For that reason, he added, many large CAD users are looking at Anvil 1000 as a training system for their Anvil 4000 CAD systems.

Drawing Processor II

Another entry on the list of CAD systems for micros is the $995 Drawing Processor II, developed by BG Graphics Systems, Inc. of Kent, Wash. Version 2.0 of the Drawing Processor II, which debuted last month, is designed for computer-aided drafting and is available with an optional $275 mouse interface, according to Candy Lane, BG Graphics' marketing director.

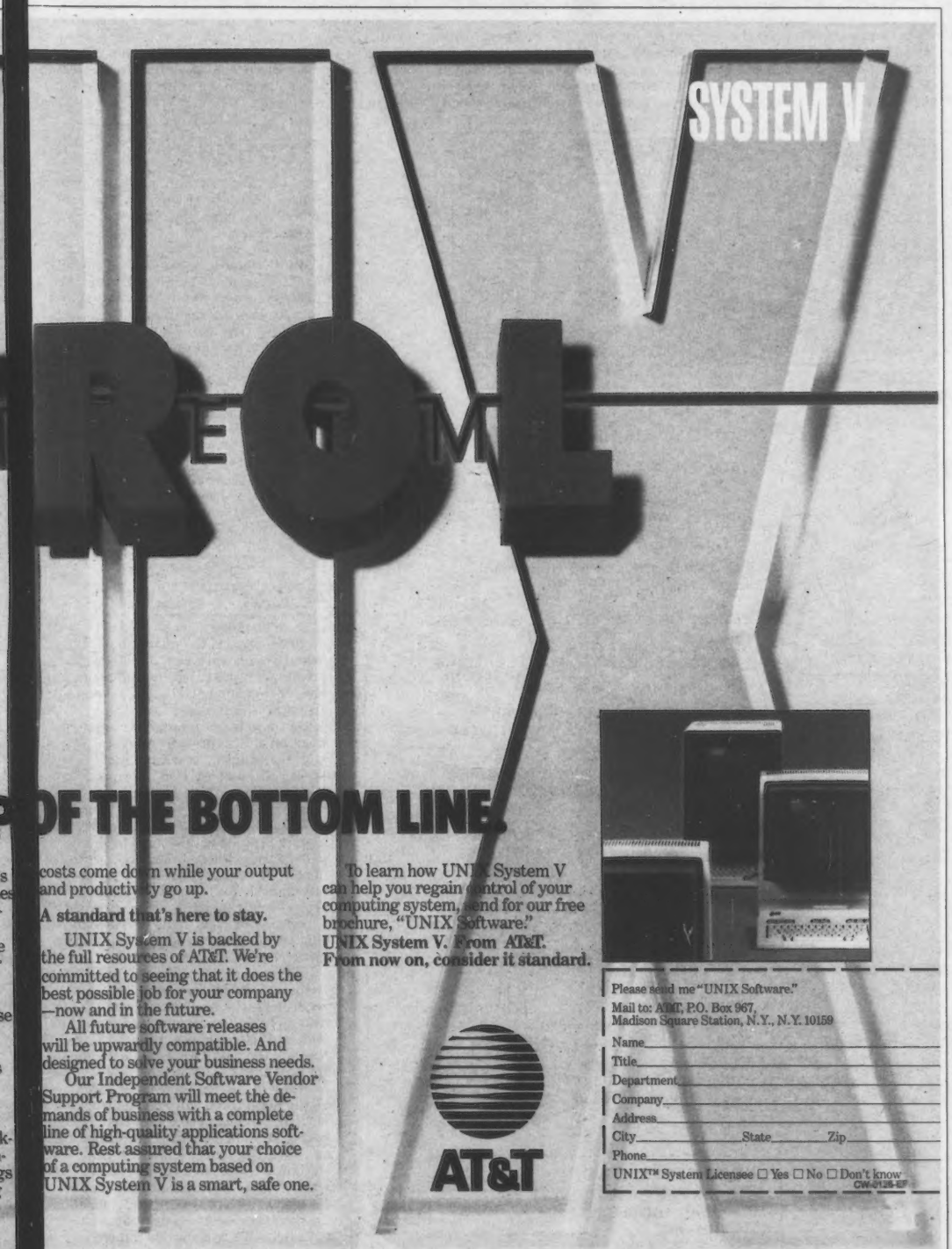
Rick Bousley, a former Boeing Co. manager and now president of BG Graphics, said he produced the software after recalling the difficulties he faced in getting access time on the aerospace manufacturer's centralized CAD system. His department at Boeing exceeded its budget by 200% in his last year there because of continual changes that had to be made in its drawings, he said.

"I was paying [under a chargeback system] to have the same job done over and over," Bousley said. "With a $7,500 micro-based workstation, I would never have gone over budget."

Drawing Processor II, designed for the Personal Computer XT and AT, reportedly offers layering under which users can treat drawings as a series of separate layers; component menu extension, under which users can create their own menus for symbols or components used in their line of work; and dimensioning, under which the software generates witness or dimension lines between any two points on a drawing.

Foundyller said that the award for the most popular of all micro-based CAD systems, though, must go to Autodesk's Autocad, a product that now rivals IBM's Cadam software in number of instal-

See CAD page 74



CAD from page 73

lations. Foundyller claimed that Cadam has 15,000 installations, while Autodesk will have 12,500 by year's end.

Maryanne Zadfar, Autodesk's director of marketing, agreed with Foundyller's estimate of Autocad's installed base and claimed the product has met such success because "We offer 90% of what you get in a mini- or mainframe-CAD system."

Autocad 2, the latest version, was introduced in October at a cost of $1,000 and reportedly offers full dimensioning, which enables a user to dimension angularly or from a center mark or radius; full hatching display, which enables a user to fill an image with cross-hatched lines; and addition of user-defined drawing entities such as fonts and symbols.

This quarter, Autodesk will begin shipments of two Autocad options, Zadfar said. Its Level 1 three-dimensional drawing add-on will be priced at $500 and provide 360-degree image rotation. Its CAD Camera software option reportedly will work with an image digitizer, such as the Wang Laboratories, Inc. Professional Image Computer (PIC) image processing system, to translate paper drawings into CAD images. With a Wang PIC, CAD Camera will cost between $7,500 and $8,200. The software alone will cost $3,000.

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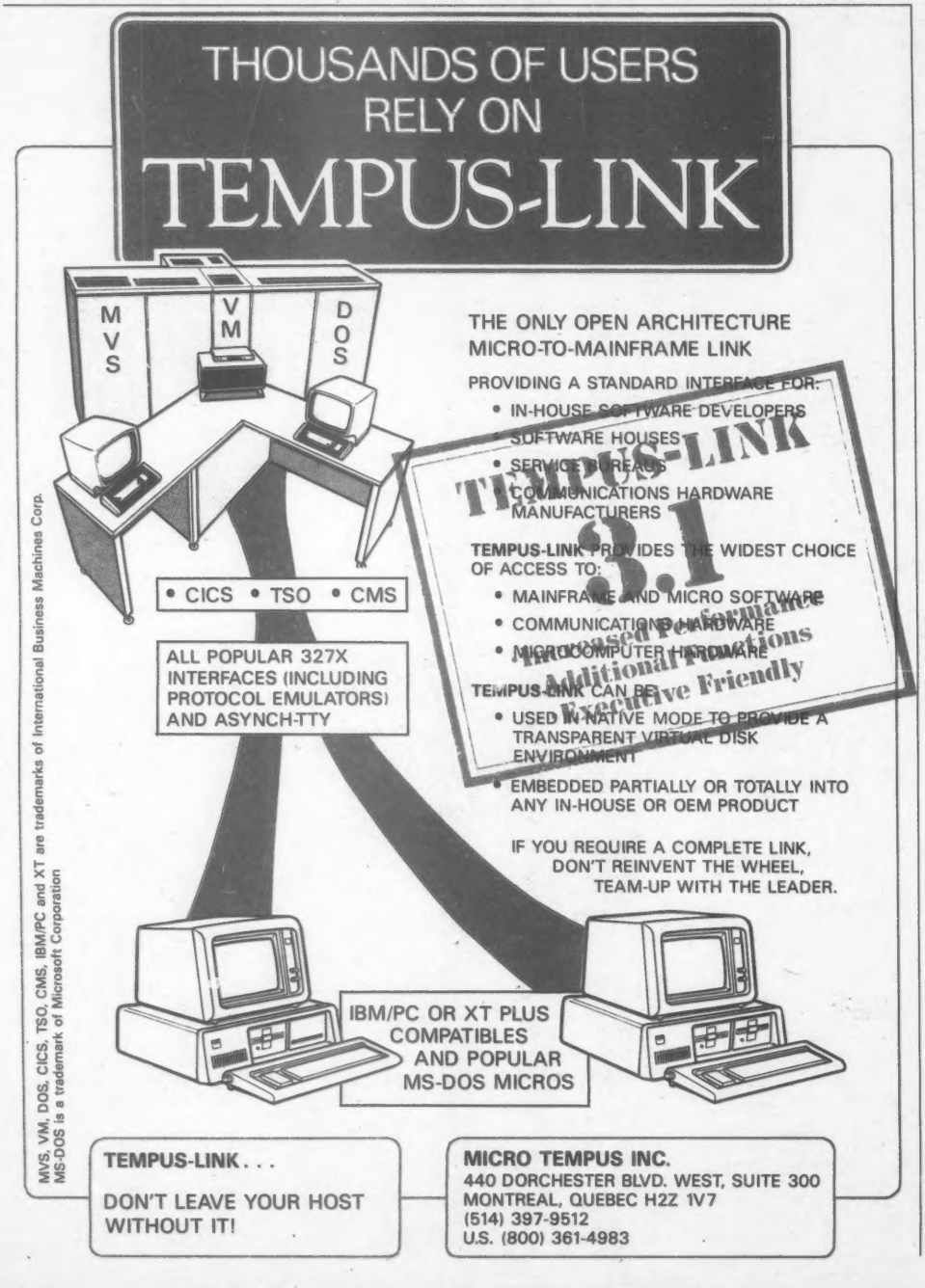
> *Some clients now specify that designs be done with CAD systems because CAD offers greater precision than hand-drawn designs.*

If the demand for low-cost CAD systems booms, Autodesk's Zadfar suggested, it will not just be because engineers want faster response times and architects want to step into the CAD world. Some clients, such as the U.S. government, now specify that designs be done with CAD systems because CAD offers greater precision than hand-drawn designs, she said.

Foundyller forecast that IBM soon will introduce a product based on AT&T's Unix that he called "Personal Cadam" for the next version of its Personal Computer or the IBM 5080 graphics workstation.

IBM will not be the first of the major vendors known primarily for mini-based CAD systems to venture into the micro-CAD world. Computervision Corp. of Bedford, Mass., is already marketing Microcad software, which uses a command structure structure similar to Computervision's Cads 4X mini-based CAD system.

Priced at $5,800, Microcad runs on the IBM Personal Computer XT and requires a minimum of 500K bytes of memory and the Intel Corp. 8087 math coprocessor. According to the Steve Ford, president of 4-D Graphics, Inc. of Reton, Wash., which developed Microcad, the software offers a "full set of three-dimensional wire frame [design system] tools."



REQUEST from page 65

because Request automatically converts them into the syntax the program uses once the user selects it from a menu.

■ When records are entered in the data dictionary, those with common fields are linked by an indicator, allowing the user to retrieve related information with a pointer.

■ Question-mark processing allows users who have forgotten a field name to type in a question mark and get a display of field names to prompt their memories.

■ It can manage up to 65,000 records and find one record among the 65,000 in three seconds.

The MS-DOS version will sell for $695 for a single-user micro and $1,500 for multiuser machines.

System Automation Software is located at 8555 Sixteenth St., Silver Spring, Md. 20910.

PIRACY from page 65

chip to do it."

Then there is the question of whether software vendors intend to swallow all the expenses and write them off against the loss of revenue from pirated copies.

So there is not unanimous agreement on this approach. Among doubters, Digital Research, Inc. President John Rowley said it seems a clumsy solution to a problem that may be overblown.

Many others feel that litigation is a more promising deterrent to software piracy. Russell Gee, vice-president of Access Technology, Inc., offered another alternative: "I'd like to see everyone take the software creed — raise your right hand and swear that you're going to be good boys and girls," he joked.

In any case, users may end up with a hardware/software remedy regardless of whether they want it, as major vendors, including Lotus, Microsoft Corp. and Ashton-Tate are backing the move. IBM is waiting on the sidelines at the moment.

Many in the industry view Lotus as the main force behind the effort, although the Adapso committee has been scrupulous about requesting comment from any concerned. But the work "is not just for the software industry," emphasized committee member Marv Goldschmitt, vice-president for business development at Lotus. "We're a service industry, and we must keep that in mind."

COMPUTER INDUSTRY

Views vary on cause of HP exec exodus

By Kathleen Burton
CW West Coast Bureau

Paul Ely Jr., the recently named president of Convergent Technologies, Inc., is not the first high-powered Hewlett-Packard Co. executive to heed the siren call to pilot an entrepreneurial company into uncharted waters.

Besides Ely, other senior-level executives who have left HP's fold since July are Edward McCracken, a 17-year HP veteran who is now chief executive officer (CEO) of Silicon Graphics, Inc. in San Jose, Calif.; Edward Hayes, who left HP last fall to become marketing vice-president at Plexus Computers, Inc. in San Jose but who has since returned to HP; and Richard Moore, former general manager of HP's engineering division and now CEO of Valid Logic Systems, Inc. in Santa Clara, Calif.

Company insiders said the reasons for the executives' departure are varied, but opinions are divided about whether this exodus was caused by the recent ferment and change within HP.

McCracken, who left HP last July to head Silicon Graphics, a small start-up firm that designs very large-scale integration chips for engineering workstations, said he left primarily for the challenge of leading a fledgling company into a new marketplace. Predicting the HP exodus will pick up steam in the months ahead, McCracken said. "Recruiters know that HP, with its small-group-oriented entrepreneurial atmosphere, is a good breeding ground for developing top managers with the necessary skills to turn around troubled start-ups."

Hayes, another HP veteran who served as general manager for HP's business computers group from 1980 to 1984, left the company in September for a post at Plexus, a more freewheeling start-up, but has since returned to HP. According to an HP insider, Hayes missed HP's support structure where "everything clicked organizationally."

But analysts and HP insiders said Moore's abrupt departure from the company last year was the result of the reorganization of the computer-aided engineering department he had headed.

Roy Verley, HP's public relations director, denied that HP is the culprit in the recent talent outflow. Verley said the July reorganization, which shuffled divisions and personnel within the company, may have caused dissatisfaction among some senior executives, but, more importantly, a severe shortage of seasoned managers is causing "headhunter fever" in the Silicon Valley. That has caused start-ups to offer attractive benefits and salary packages to lure top-level executives.

See HP page 90

■ A strategy of helping MIS and DP gain control over microcomputer proliferation has produced a 770% revenue growth for a California-based distributor/78

■ The tightly held Computerland Corp. is the subject of a bitter lawsuit under way in California; at the heart of the issue is an old IOU that may be convertible for 20% of Computerland's stock/82

■ The planned $16 million acquisition of Visual Technology Corp. by Lee Data Corp. was called off recently; Visual Technology reported a large loss for the quarter and restated earlier results/88

No quick recovery for chips

Analysts adjust growth forecasts to slack mart

By Kathleen Burton
CW West Coast Bureau

MENLO PARK, Calif. — Semiconductor manufacturers are facing pressures from a slack semiconductor market, and analysts said no substantial recovery is expected until the middle of the year.

Surprised by the weakened demand for semiconductors, chip industry analysts are cutting their growth projections. Dataquest, Inc., a San Jose, Calif.-based market research firm that last year projected the chip industry would grow 22% in 1985, now estimates about a 6% growth for the year, according to a company spokesman.

> *Surprised by the weakened demand for chips, industry analysts are cutting their growth projections.*

Semiconductor demand soared six months ago, and most companies added staff and ramped up capacity, adding new plants and equipment. Now the situation is reversed, and customer demand is down, but the staff and equipment remains, causing high overhead, according to Sheilah Sandow, a spokeswoman for the Semiconductor Industry Association (SIA) in Cupertino, Calif.

SIA President Tom Hinkelman predicted a 2% to 5% growth rate for the U.S. market this year, down from an earlier 21% prediction. In November, chip makers received new orders at an average monthly rate of $589.9 million for the U.S. market, a decline of about half from the booking rate six months before, and in December, the book-to-bill ratio — a comparison of semiconductor shipments to orders — fell to 0.58, an industry low, Hinkelman said.

Industry watchers said the somber atmosphere in the industry is reminiscent of

See CHIP page 90

Xerox declares Shugart unload

By Kathleen Burton
CW West Coast Bureau

SUNNYVALE, Calif. — Xerox Corp. recently announced it will phase out Shugart Associates, Inc., the disk drive manufacturer it purchased in 1978, and said it expects to lose $85 billion from the decision to close or sell Shugart's various divisions.

Xerox, based in Stamford, Conn., purchased the hard- and floppy-disk manufacturer nine years ago for $41 million in Xerox stock. Since then, industry watchers say, Shugart has been poorly managed, new products have not kept pace with the competition and key management talent has left the company for more lucrative start-up ventures.

James R. Lamb Jr., a Xerox spokesman, said Shugart was being phased out because competition within the industry eroded prices and caused substantial losses and because Shugart's products "are not strategically important to Xerox's long-range plans." Xerox will reallocate Shugart re-

See SHUGART page 89

Will export review work?

INDUSTRY INSIGHT
Bryan Wilkins
CW Staff

Four years of tense jurisdictional fighting between the U.S. Department of Commerce and the Department of Defense over computer exports recently concluded when President Reagan ordered a resolution. Simply put, the U.S. will be as strict as it can in preventing any technology with a potential military application from reaching the Soviet Union and its allies. The DOD will make sure of it.

The International Trade Administration, a subagency of the Commerce Department whose job it is to promote U.S. goods overseas as well as approve export licenses, has somewhat successfully fought to limit the DOD's role in reviewing export licenses. Reagan's decision, however, allows the DOD to look at export licenses that contain equipment capable of military applications bound for countries thought of as U.S. allies, such as Sweden, Austria, Switzerland and Taiwan.

There will be a limit of 15 non-Communist countries on the DOD agenda at any one time, in addition to the Eastern bloc countries already restricted for the export of

See EXPORT page 89

Walker scales back operations, lays off a third of work force

SAN FRANCISCO — In a move described as an "adjustment" following a three-year period of rapid growth, Walker Interactive Products, Inc. last month laid off about a third of its work force and scaled back its applications software operations.

Layoffs were rumored to number about 100 employees, a figure which was described as "fairly accurate" by a Walker employee. Walker now employs about 180 people worldwide, a company spokesman said.

Walker President Richard Currier said the actions were prompted by increased competitive pressure and a need to slow Walker's growth rate. "We've had [a] 25-to-one growth in the last three years, and we're rethinking whether it's possible to continue to grow at that rate," he said.

Currier noted that price-cutting competition in the applications software market became so intense in 1984 that Walker was not meeting sales projections.

He said cuts have been made across the board throughout the company, with the exception of the recently formed systems software division. "They are now experiencing the kind of growth that Walker as a company experienced two years ago."

The changes were also prompted by high-level management changes that recently brought in Craig Carlson, formerly of Electronic Data Sys-

See WALKER page 89

China looks to West to meet industrial computer

OUTSIDE LINES
Bohdan Szuprowicz

The formation of IBM China, sales of shares in Chinese companies to the public, talk of establishing a stock exchange and a recent Sino-Soviet detente in the commercial area are radically changing the rules of the game in the China market.

Companies that have been rushing headlong to supply China with the latest high-technology products may now have second thoughts, and most of these companies are bound to refocus their marketing policies.

Energy, transportation and electronics are now the three top development priorities in China. This should not surprise anyone who is aware that more people in China than in the entire U.S. still have to make do without electricity.

Electric power generation and its distribution are an immediate necessity before almost a quarter of China's population of one billion can switch on an electric bulb at night, let alone plug in a personal computer.

Nevertheless, China's work force is estimated at almost 450 million in a centrally planned economy that gives rise to an unmatched gargantuan bureaucracy.

Key to modernization

Slowly but surely the Chinese are beginning to realize that the key to modernization is the computerization of massive central files in numerous industries. These industries require powerful high-speed mainframes with huge storage capacities, reliable telecommunications and local-area networks and large numbers of personal computers, workstations or terminals. With a massive training effort of a standardized nature required, only organizations of IBM caliber are up to that task.

Until a few years ago, China pursued domestic manufacturing of large, medium, mini- and microcomputers based on some licenses and reverse engineering programs. In 1984, it even announced the development of its first supercomputer, known as the Galaxy 100, which reportedly has a top speed of more than 100 million operations per second.

But as years went by, China became very much aware that, like its previous large-scale computers, only a few units will be built before these are rapidly made obsolete by Western hardware developments. In fact, since 1958, China has developed approximately 200 different computer models, but only 10 of those have reached serial production of a few hundred units at best.

As a result, at the outset of the current 1981-85 five-year plan, China drastically changed its policies pertaining to the development of electronics in general and the computer industry in particular.

Current plans

Current plans call for a concentrated effort to develop significant manufacturing capabilities in micros , an effort expected to reach 10,000 units manufactured in 1985 and four times that level by 1990. Recent imports of large quantities of microcomputers from various vendors appear to be a temporary measure to meet immediate demand and acquire manufacturing know-how for domestic production.

Although China also expects to increase its production of medium systems, mainframes and minicomputers to about 1,000 units in 1985 and almost double that by 1990, its new policy calls for continuing imports of large and medium systems.

The huge potential of that market does not become ap-

Szuprowicz is president of 21st Century Research of North Bergen, N.J., and publisher of Supergrowth Technology USA.

needs, but less reliance seen on micro imports

parent until one considers the overall computerization objectives of the country. The import of modern mainframe systems is critical to China because its immature data processing industry is now becoming a bottleneck to modernization of its large industrial plants in all sectors of the economy.

More specifically, Chinese ambitions for 1990 are to achieve a computerization level per million of population comparable with that of Spain in 1975; this could mean an almost tenfold increase in the number of mainframes and minicomputers.

But China cannot come anywhere close to that goal without a massive import program of mainframe systems from the West. This apparently is one of the reasons why IBM moved so swiftly into China. The company is expected to install 60 mainframes in China during 1985, twice the number of all IBM machines installed since 1979.

During the last few years, China has accumulated almost $20 billion in hard currencies, which is more than enough to pay for a massive mainframe import program to meet the 1990 computerization objectives. At the same time, any production of IBM 5550 desktop machines in China could offset some of the cost through exports to the rest of the world. IBM already purchases Chinese-made transformers and computer covers, and the potential for offset trade in this area is huge.

The proposed trade escalation with the Soviet bloc will also save China more hard currency because it can obtain Soviet power generation equipment, trucks, rolling stock or even aircraft in exchange for Chinese textiles and agricultural products, for which there are limited markets in the West.

On the other hand, this new Sino-Soviet detente may increase Western pressures for stricter export controls of computers and telecommunications equipment to China.

Soviet access to West

It is conceivable that advanced Western mainframes could end up in plants originally built by the Soviets; under a new arrangement, the Soviet Union is going to modernize these plants, thus gaining access to Western technologies.

There are also some political analysts who maintain that there is a significant group of Chinese communist and military leaders who are not happy with the quasi-capitalist innovations of recent years. Since Deng Xiaoping is already 80 years old, the analysts fear that after his death, China may once again be in the throes of a domestic upheaval.

The current Chinese play of the "Soviet Card" is an indication of the direction in which things may move in the future.

Whatever happens, however, it appears certain that China intends to establish itself as a low-cost manufacturer of microcomputers and other electronic products and may be eyeing Eastern and Western markets simultaneously.

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Firm raises revenues 770% with on-line guide to micros

By Peter Bartolik
CW Staff

FRAMINGHAM, Mass. — Helping MIS/DP managers gain control of microcomputer hardware and software proliferation resulted in a 770% revenue growth last year for a California-based distribution and service company.

One Point of Walnut Creek, Calif., was formed in early 1982, a year in which it sold $10,000 worth of microcomputer products. In 1983, the company experienced total sales of $1.5 million and in 1984, skyrocketed to sales of $11.4 million, according to company founder and President Stevan Cloudtree. With plans to open five regional offices this year, the company is anticipating sales of more than $30 million, Cloudtree said in a recent interview here.

Cloudtree said the creative spark behind the founding of One Point occurred when he was general manager of a company and was caught up in the acquisition of microcomputers and selection of software. "The kind of information I wanted and was used to getting for minicomputers and mainframes was just not available for micros," he said.

Seed money funds on-line data base

With seed money provided by company cofounder and Executive Vice-President Jonathan Hathaway, who spent 20 years in sales positions with IBM, One Point developed proprietary software to operate an on-line data base for dissemination of product information and order processing.

Backed by venture capitalists, the company made the One Point Information Network available over Tymnet, Inc.'s Tymshare service, providing daily updated information on available products.

According to Cloudtree, MIS/DP executives at large companies are "besieged [and] under lots of stress" as microcomputers proliferate and end-user demands multiply. MIS/DP departments, he said, are under pressure both from management to improve productivity and from users for improved service and support.

Users are beginning to ask for diversified software products that offer job-specific functions, and micro support groups within corporate organizations are beginning to buy stripped-down micros and adding on equipment features that best serve their needs, Cloudtree asserted.

Complicating those facts of life is the tendency of small microcomputer software suppliers to compete solely on price and minimize service and support functions.

Prepurchase consulting available

Cloudtree said One Point eases the pressures by providing MIS/DP departments with prepurchase consulting that can include information on likely vendor support, comments on particular packages by previous users and evaluation packages.

The key component of the company's various offerings, which include educational seminars, is the information network that Cloudtree said can be customized for use on the user's local-area network. "Our job is to help MIS/DP manage the micro explosion," Cloudtree said.

While cost is always an important consideration, MIS/DP is most concerned about what can be expected from both vendor and product after a purchase is made, he said. Another concern is scheduling delivery of products to fit in with the MIS/DP implementation schedule, he added.

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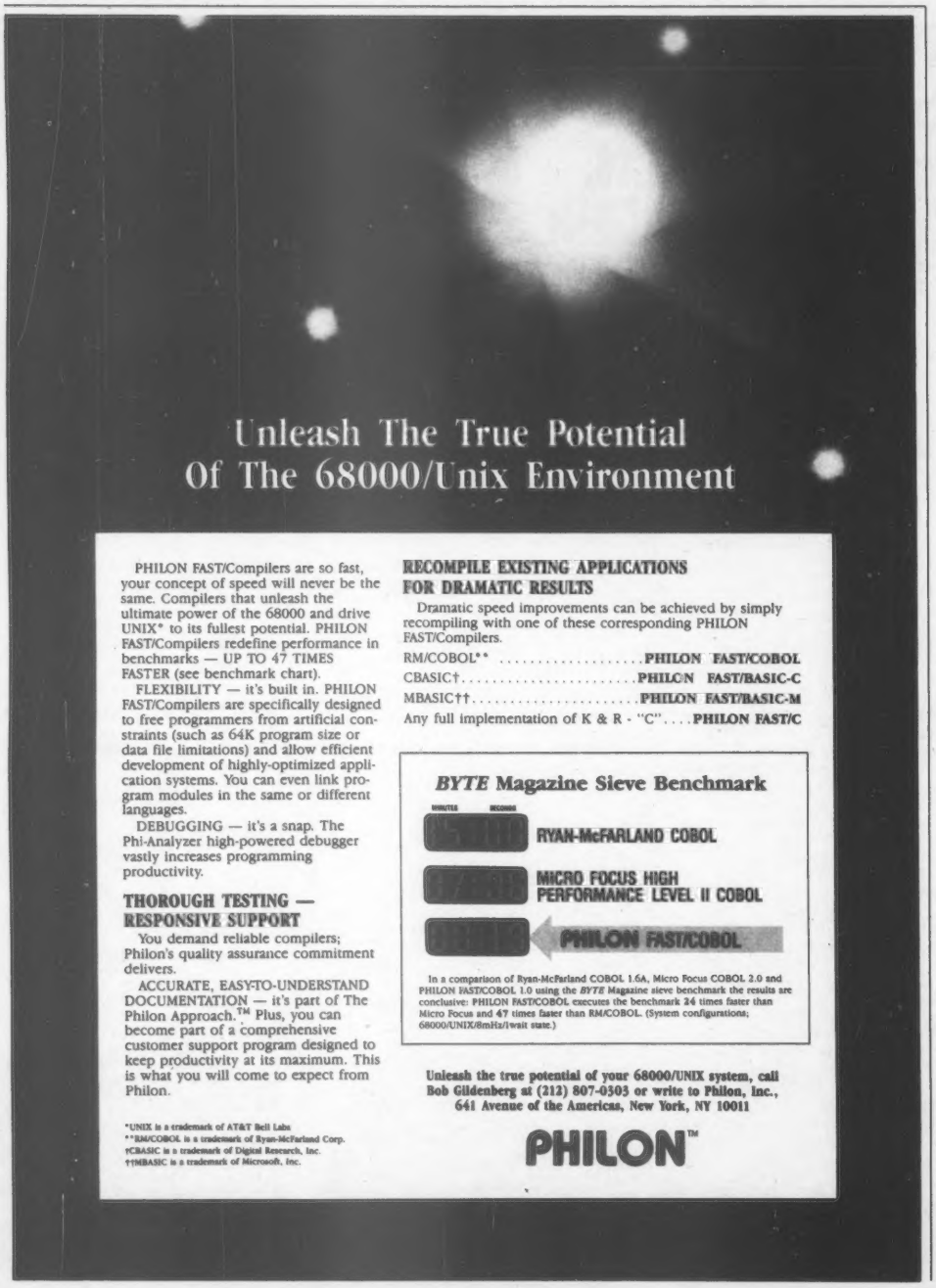
> *'The kind of information I wanted and was used to getting for minicomputers and mainframes was just not available for micros.'*
>
> —Stevan Cloudtree
> One Point

One Point's solution, according to Cloudtree, has earned it 500 customers among the Fortune 2,000 ranking.

Actual distribution of products "is a low-margin, very competitive business," Cloudtree said. The key to funding the company's expansion plans is the proprietary, higher margin information network. In its effort to build value into that service, the company developed a software package that automatically will connect an IBM Personal Computer-compatible microcomputer into the data base via a Hayes Microcomputer Products, Inc. Smartmodem.

Providing ease of use in a communications service, according to Cloudtree, "allows any user within a corporation to have access" to it without having to learn complicated dial-up routines and without having to undergo rigorous training to use the service.

Branching out, One Point recently reached an agreement with First Software Corp. of Lawrence, Mass., to make a version of the One Point network available for retail stores. First Software will underwrite the cost and plans to place the service in 1,000 retail stores.



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The NOMAD2-SQL/DS combination is much more than just an interface. It is the blending of the best 4-GL with the best DBMS available that comprises an entity greater than the sum of its parts. More specifically, the broad spectrum of capabilities that comprises SQL/DS can be accessed and controlled by dealing solely with NOMAD2.

NOMAD2's single-command environment, unmatched report writer, statistical and interactive decision support capabilities and, most importantly, its richness of language have made it the hallmark 4-GL against which all others are measured. And it is through these attributes that the sheer power of SQL/DS can be fully realized.

The NOMAD2-SQL/DS interface represents the latest innovation from D&B Computing Services. In making NOMAD2 available for use on in-house mainframes, we have continued the evolutionary process we began in 1975 when NOMAD was first introduced. And it is this evolutionary process that has catapulted NOMAD2 to the leadership position it holds in the marketplace.

If you are currently using SQL/DS in your VM environment, or even if you're just considering it, take a look at NOMAD2 now. Most people who try NOMAD2 buy it.You owe it to yourself to find out why.

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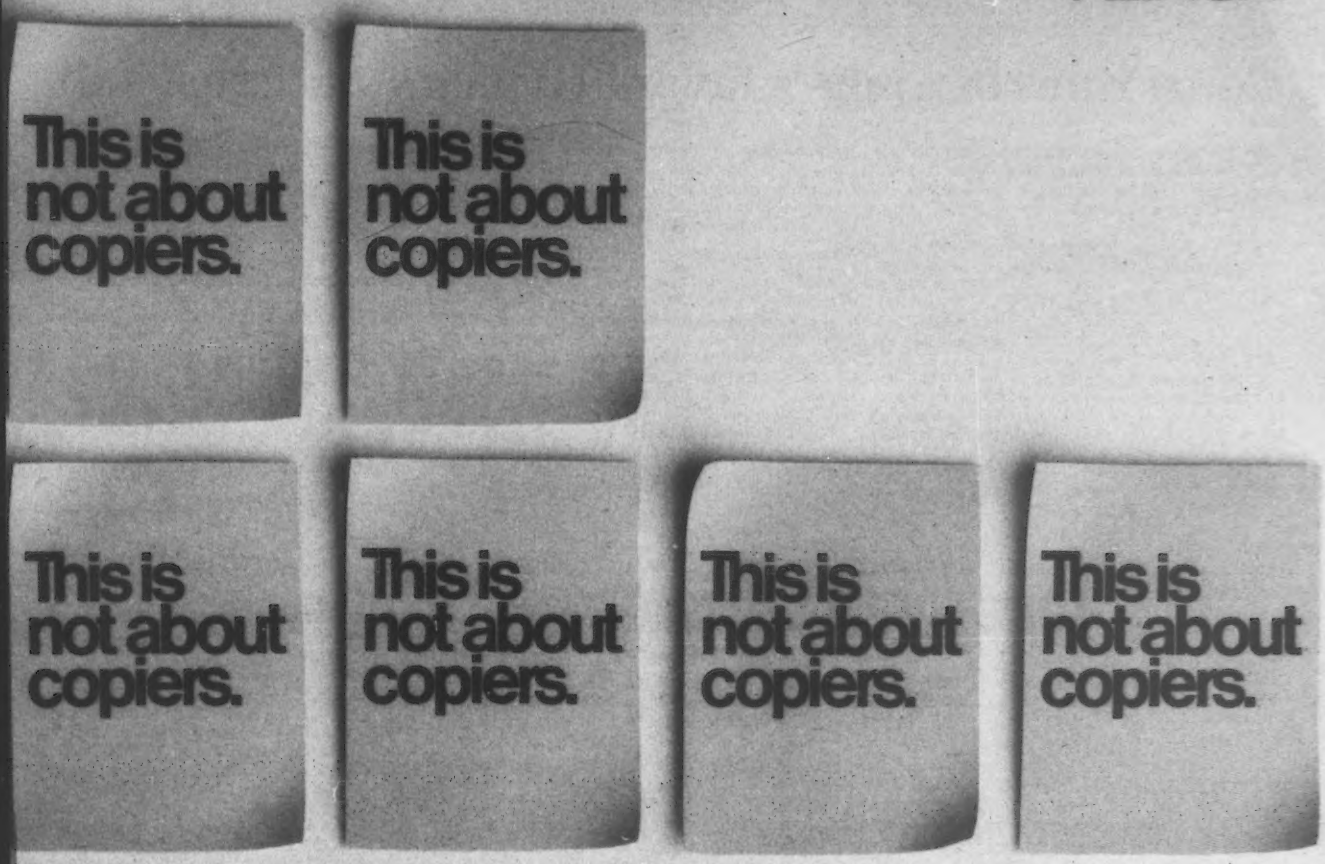

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*Industry report refers to IDC Industry Report

Court rules in Apple's favor in dealers' antitrust suit

LOS ANGELES — A U.S. judge recently awarded a summary judgment in favor of Apple Computer, Inc. in an antitrust suit lodged by six retail computer distributors concerning Apple's policy prohibiting mail-order sales.

U.S. District Judge Pamela Ann Rymer ruled that the six distributors had failed to show sufficient evidence to support a reasonable finding in favor of their claims that Apple was restraining trade when in November 1981 it modified its dealer agreements with retail stores and chains to prohibit mail-order sales.

An earlier attempt by Apple to have a summary judgment entered was denied in 1983, even though the judge hearing the case at that point had declined to issue a preliminary injunction against Apple and expressed doubts about the merits of the claims by the dealers. According to case law cited by Rymer, summary judgments should be used sparingly in complex antitrust cases. In the Apple case, however, there was no evidence for a finding in favor of the dealers based on a recent court case that required more stringent evidence in cases of distribution agreements.

No after-sales support

Apple had argued that it was necessary to prevent mail-order sales because dealers engaging in mail-order practices did not provide the after-sales support Apple determined was necessary to promote a favorable business climate in a highly competitive market. Apple said dealers that provided after-sales support were placed at a competitive disadvantage.

The antitrust suit was filed in December 1981 by six computer dealers: OSC Corp. (also known as Olympic Sales Co.); Computer Consoles, Inc.; Advanced Computer Products, Inc.; Custom Computers; Computer Specialists; and Micro Business World, Inc. The dealers argued that the mail-order policy was designed by Apple in conjunction with several of its larger dealer accounts as an attempt to cut discounting practices. The court held there was no evidence of such a conspiracy, noting that discounting occurred after the mail-order policy was established and that agreements with Apple allow dealers to set prices.

Gary L. Reback, a Palo Alto, Calif., attorney with the firm of Fenwick, Stone, Davis and West representing Apple, said the case provided vendors "with greater leeway over controlling distribution."

The ruling, according to Reback, allows manufacturers to exert controls over distribution channels to ensure that products are marketed in a manner that promotes the manufacturers' competitiveness.

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Computerland fights investors

By Kathleen Burton
CW West Coast Bureau

OAKLAND, Calif. — In a major legal battle begun earlier this month in Alameda Superior Court here, Computerland Corp., the country's largest personal computer retailer, is attempting to stave off outside investors who are pressing a claim for 20% of the company's stock.

At stake are Computerland assets valued at between $300 million and $500 million, dividends and interest up to $12 million and punitive damage claims that could total $300 million, said Herbert Hafif, attorney for plaintiff John Martin-Musumeci, a former Computerland executive. Hafif said a settlement could threaten Computerland founder William Millard's hold on the closely held firm.

Millard and his family currently hold 94% of Computerland's outstanding stock. The Hayward, Calif.-based company has 775 franchises and stores in 25 countries and had a 1984 sales goal of $1.5 billion.

Dispute deals with IOU

The dispute centers around an IOU based on a $250,000 venture capital investment made in Computerland in 1976 by a Massachusetts-based venture capital firm, Marriner & Co. The IOU, which Martin-Musumeci claims is convertible into a 20% share of any one of several Millard-owned companies, was bought from Marriner in 1981 by Micro/Vest, a company started by Martin-Musumeci.

Micro/Vest, based in Morago, Calif., filed suit in April 1981 when Computerland disputed its claim for the note.

Hafif said the case is centered around the fact that the Computerland assets are both assignable and convertible to another purchaser.

Oral agreement crucial

Millard's attorneys claimed that an oral agreement with Marriner's principals specified that the stock conversion option could not be transferred to outside investors and that the stock conversion rights applied only to several other small Millard businesses.

Opening arguments began Jan. 14. The trial could last for up to two months, attorneys said.

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Studies relate birth defects to high-tech toxins in water

By Kathleen Burton
CW West Coast Bureau

SAN JOSE, Calif. — Miscarriages and birth defects occurred at two to three times the average rates in areas where water supplies were contaminated by chemicals used in high-technology manufacturing, according to two related studies recently released by state and county health agencies.

The two-year studies were conducted by the California Department of Health Services and the Santa Clara County Health Department. Both agencies studied infants born between 1980 and 1981 in a San Jose suburb that had been contaminated by toxic leaks from a nearby Fairchild Camera and Instrument Corp. semiconductor plant.

Study results indicated that the rate of miscarriages in the test group was 2.4 times greater than in the control group, the birth defect rate was 2.5 times greater than the national rate, and the rate of major heart abnormalities in the infants was three times greater than the control group, according to public health officials. The control group was a nearby community with no known water contamination, the health officials said.

The water in the San Jose neighborhood of Los Paseos was contaminated with TCA (also called methyl chloroform), a chemical solvent used to clean grease from semiconductors, health officials said. While the study did not directly link the birth abnormalities to the contaminated water, conventional causes of birth defects, such as smoking and the medical histories of the mothers, were ruled out, according to health officials.

The Fairchild leak was discovered in December 1981 in an underground storage tank near a well that provided drinking water to part of Santa Clara's Great Oaks Water District, said Kenneth Kizer, deputy director of the California Health Services Department. After the leak was discovered and the well shut down, subsequent tests found that toxins in the water were sometimes up to 800 times higher than the state's recommended levels, Kizer said.

Although contaminated drinking water cannot be ruled out as a contributing cause, there are still incongruities relating the Fairchild spill to birth defects, Kizer said. According to Kizer, a major uncertainty remains as to whether the seepage began before 1981. Additionally, Kizer said, the faulty tank contained a variety of solvents, and it is uncertain which toxins were involved. To clarify these matters, Fairchild will provide additional documentation and data about the chemicals, Kizer said.

Francine Plaza, communications manager for Fairchild, said that the report substantiated Fairchild's position that several factors besides the leaks may have contributed to the defects. "The study raised more questions than it answered," Plaza claimed, and said it focused on "random samples of people in the wrong place at the wrong time."

There are currently more than 400 lawsuits pending against Fairchild from Las Paseos residents who claim that the contaminated water caused cancer, brain damage and birth defects, according to Gerson Smoger, a lawyer for the residents.

Cliff Bowen, district engineer for the California Public Health office in Berkeley, said approximately 100 toxic leak sites affecting local water supplies have occurred in the Silicon Valley over the past two years. Most major electronics firms in the area are involved, he said, including IBM, National Semiconductor Corp. and Teledyne, Inc. Fairchild and IBM have each spent more than $20 million to remedy the leaks, he added.

Bernice Giansiracusa, County Director of Public Health for Santa Clara, said air pollution could not be ruled out as a possible cause of health abnormalities. Giansiracusa said the U.S. Environmental Protection Agency will examine air quality in the area as part of a larger project.

California Gov. George Deukmejian has earmarked $625,000 in his proposed 1985-86 budget to continue the investigation, health officials said.

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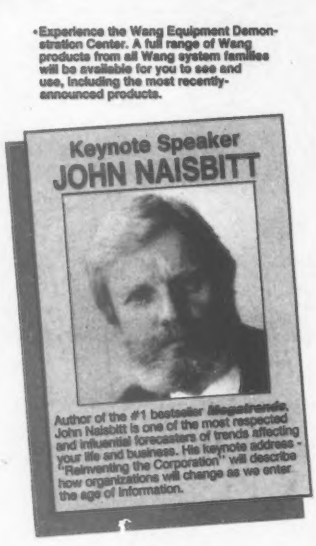

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Poppa takes over as STC chairman

LOUISVILLE, Colo. — Ryal R. Poppa, formerly chairman and president of BMC Industries, Inc., was recently named chairman and chief executive officer of Storage Technology Corp (STC). Poppa, named to succeed STC founder Jesse I. Aweida, was charged with the task of bringing STC through a reorganization under Chapter 11 of the Federal Bankruptcy Act — a task that most analysts now believe will be based on selling off some of STC's divisions.

Before taking over as head of St. Paul, Minn.-based BMC, an electronics parts manufacturer, Poppa headed Pertec Computer Corp., which was acquired by Triumph-Adler AG.

Poppa was given a court-approved salary package that included a $300,000 annual salary, bonus and stock provisions and termination compensation of $900,000 in the event STC is sold or liquidated.

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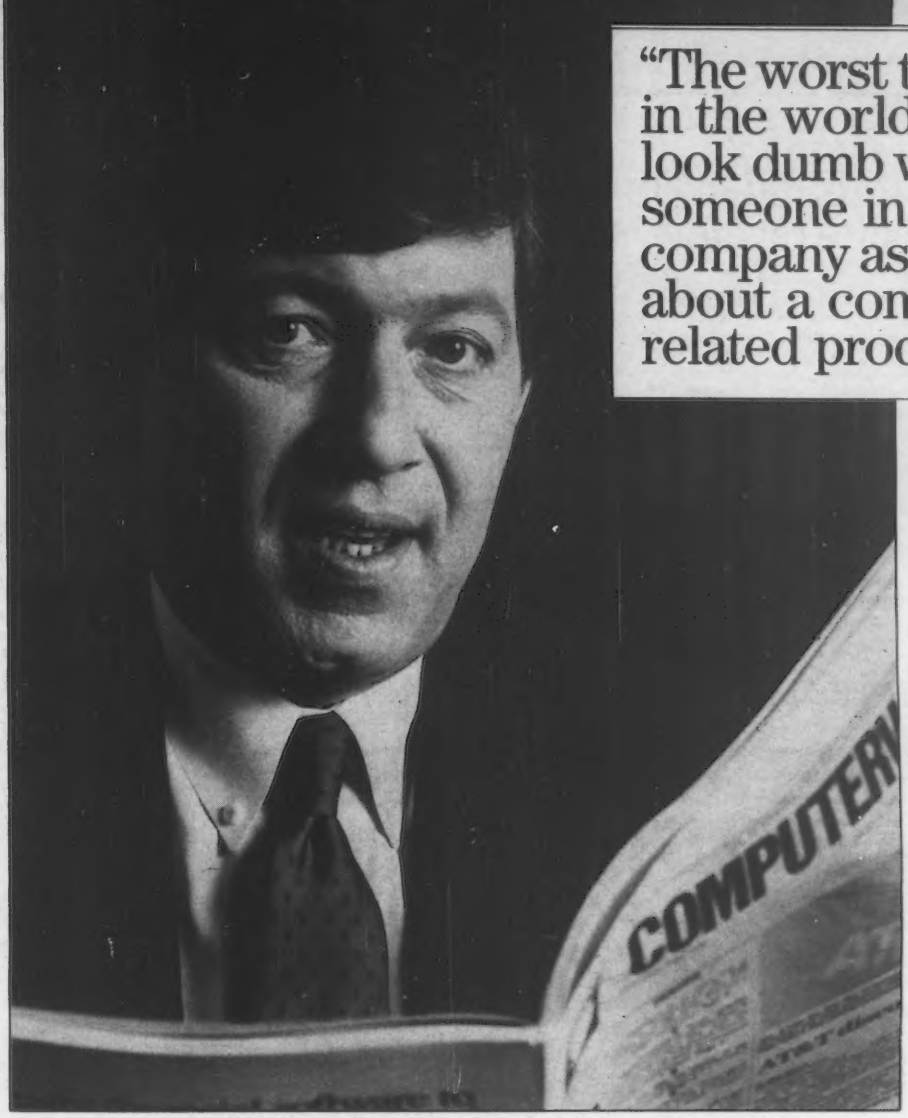

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Sperry's third-quarter profits down despite revenue increase

NEW YORK — Sperry Corp. reported last week that third-quarter profits from continuing operations were down 10% compared with one year earlier, while revenue increased 23%.

Profits for the third quarter were $61.2 million, or $1.09 per share, compared with year-earlier profits of $68.1 million, or $1.32 per share. Revenue for the quarter was $1.45 billion, compared with $1.18 billion a year earlier.

Sperry pointed out that it took an after-tax charge of $12.7 million, or 23 cents per share, against earnings as a result of an arbitration proceeding with the government of Israel. In the third quarter a year ago, the company also experienced a nonrecurring after-tax gain of $10.1 million, or 20 cents per share, from the sale of a facility.

Disregarding the after-tax charge and last year's extraordinary gain, "Income from continuing operations in the current quarter rose 27% over last year," a spokesman said.

The company's Information Systems segment, under a reorganized structure announced in September, experienced revenue growth of 43% and operating profit growth of 30% over the year-earlier period.

Honeywell cites Synertek loss in fourth-quarter profit slump

MINNEAPOLIS — Posting a $70.6 million write-off related to its decision to dispose of its semiconductor subsidiary, Honeywell, Inc. recently announced that its fourth-quarter profits slumped to $31.8 million, or 68 cents per share, compared with year-earlier profits of $91.9 million, or $1.98 per share.

For fiscal year 1984, Honeywell reported profits from continuing operations were up 33% to $334.8 million, or $7.14 per share, compared with 1983 profits of $250.7 million, or $5.46 per share. Those results included an extraordinary gain of $40 million, or 85 cents per share, reported in the third quarter as a result of tax law changes affecting domestic international sales corporations.

Total net income for the year, reflecting the decision to sell the Synertek, Inc. semiconductor subsidiary, was $239 million, or $5.10 per share, compared with $231.2 million, or $5.03 per share, in 1983. That included losses from the Synertek division of $25.2 million, or 54 cents per share. Fourth-quarter profits from continuing operations were $110.4 million, or $2.35 per share, compared with year-earlier profits of $102.9 million, or $2.22 per share. But total fourth-quarter results, including the Synertek write-off and a fourth-quarter loss by Synertek of $8 million, or 17 cents per share, reduced the net profits to $31.8 million.

On the bright side, Honeywell reported that operating profits from its Information Systems division increased to $180 million in 1984 from $130 million in 1983. Operating profits from its Control Products division rose sharply to $141 million in 1984, compared with $83 million in 1983.

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ADP reports revenue boost

ROSELAND, N.J. — Automatic Data Processing, Inc. (ADP) recently announced revenue of $253.6 million for the second quarter ended Dec. 31, up 16% from $218.4 million one year earlier.

ADP reported that profits for the quarter were up 15% to $20.1 million, or 57 cents per share, compared with profits of $17.5 million, or 50 cents per share for the year-earlier period.

Josh S. Weston, president and chief executive officer of ADP, said, "Stronger than anticipated new account revenue growth in Employer Services offset continuing low trading volume in Brokerage Services."

Weston said the results were consistent with earlier estimates of 15% or better growth in revenue and profits for the year.

Tektronix set to acquire CAE

BEAVERTON, Ore. — Tektronix, Inc., a manufacturer of electronic test and computer graphics equipment, recently said it has reached preliminary agreement to acquire CAE Systems, Inc. in a $75 million transaction.

Tektronix said that, subject to negotiation of a formal agreement and approval by both Tektronix and CAE Systems, it will acquire CAE Systems through an exchange of stock and it will operate the firm as a separate subsidiary.

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Alcatel Thomson Gigadisc of Redondo Beach, Calif., announced the signing of an exclusive distribution agreement with **Geac Computer Corp.**, Markham, Ontario, for the sale and distribution of Alcatel Thomson Gigadisc Optical Disk Storage Systems in Canada.

■

Advanced Micro Devices, Inc. (AMD) reported an agreement to sell certain assets of its microcomputer systems directorate. The agreement provides for assets related to AMD's line of multibus board-level products to be acquired by Central Data Corp. of Champaign, Ill.

■

Computer & Communications Technology Corp. (CCT), Santa Barbara, Calif., announced that it has entered a letter of intent with **International Signal & Control Group PLC** (ISC) providing for the sale of **Zeta Laboratories, Inc.** to ISC. Zeta is a wholly owned subsidiary of CCT that supplies microwave components and subsystems to the communications industry.

■

Intel Corp. said it plans to sell part of its Austin, Texas, operation to **SAS Institute, Inc.** under terms of an agreement in principle by the two companies.

SAS will acquire the design information, source code, product rights and support responsibilities of Intel's System 2000 data base management system, including the System 2000, Quest, Plex and Report Writer.

The terms of the sales agreement have not been disclosed.

■

Gould, Inc., Rolling Meadows, Ill., announced that its computer systems division in Fort Lauderdale, Fla., has received a $15 million contract for 17 computer systems from the Boeing Military Airplane Co., headquartered in Wichita, Kan. As part of the contract, Gould will provide Boeing with its 3297 and 3227 computers for use in aircraft simulation. Delivery of the systems began in November and will continue through June 1987.

■

Comsat General Integrated Systems, Inc. announced that it has terminated its negotiations with **Prudential Insurance Co. of America** and **Douglas Ruhe** to establish partnership for direct broadcasting satellite services. Comsat said it has significantly restructured its approach to this business area.

■

Silicon Compilers, Inc. and **VLSI Technology, Inc.** (VTI), both headquartered in San Jose, Calif., announced that they have signed a licensing agreement under which VTI will manufacture and market a chip from Silicon Compiler. Under the agreement, VTI will have exclusive marketing and sublicensing rights for the chip.

■

Wicat Systems, Inc., Orem, Utah, and Minneapolis-based **Control Data Corp.**, through its wholly owned subsidiary **USSA**, signed a letter of intent to form a joint venture that will provide products and services to kindergarten through 12th grade public and private schools in the U.S.

■

Spectographics Corp., a manufacturer of computer-aided design and manufacturing and computer-aided engineering workstations, announced the expansion of its foreign distribution to include Australia and Israel.

■

Westinghouse Electric Corp. announced it has formed an advanced production technology systems organization to design, sell and service intelligent automated work cells and systems.

■

Control Data Corp. and **AT&T Communications** announced they have signed a marketing agreement to offer businesses a quick and efficient way of using telecommunications to exchange purchase orders and inventory information between computers. Terms of the agreement were not available.

Lee Data nixes pact to acquire new subsidiary

MINNEAPOLIS — Lee Data Corp. and Visual Technology, Inc. recently announced they agreed to terminate a preliminary agreement under which Visual Technology would have become a wholly owned subsidiary of Lee Data.

Late last year [CW, Nov. 19], the companies announced Lee Data would acquire Tewksbury, Mass.-based Visual Technology through an exchange of common stock valued at about $16.8 million.

In terminating the agreement, the two companies announced that they are exploring alternative arrangements, including Visual Technology providing Lee Data with products through an OEM or licensing arrangement.

Lee Data said it will fulfill its previous agreement to provide Visual Technology with $3 million of additional financing; $1.5 million was provided in November through a purchase of Visual Technology products, the company said.

Visual Technology recently reported a third-quarter loss of $15.6 million and restated second-quarter results to show a loss of $457,000, compared with its earlier report of a $119,000 profit.

IRMA introduces a CICS file transfer system that will end PC-to-mainframe monkey business.

EXPORT from page 75

high-tech goods.

The question that arises from the turf war is whether the structure now in place for which both sides claim credit, will work. To date, the evidence is mixed. It is true that the DOD has been able to increase the efficiency of its review time. The Commerce Department has instituted a "fast-track" process that has earned plaudits from exporters.

Yet the government machinery is still impeding U.S. companies' freedom to respond to the pressure of overseas competitors, even when they know they have superior products that all but sell themselves.

Cease-fire not good for small firms

According to an estimate by an official in a Washington, D.C.-based export consulting firm, the U.S. is losing at least $1 billion a month in export sales as result of export restrictions on high-tech goods. The official asserted that the Commerce and Defense departments' cease-fire is not good for small exporters who have leading-edge products that overseas buyers are actively seeking.

Horror stories abound: export license applications that are never resolved, or an international distributor being told that the earliest his product can reach its destination is six to nine months, even though he knows a Japanese firm can get a similar one in three weeks.

Large U.S. manufacturers have it a bit easier. They can hire lobbyists at $75 an hour to follow the torturous path of an application. But the small exporter has no friends to help — he cannot afford them.

WALKER from page 75

tems, Inc., to run Walker's technology operations and Donald France, formerly of Software AG of North America, Inc., to manage financial applications.

"We did some restructuring, as typically happens when you have two new senior executives," Currier said. "It's certainly true that there are some people who are no longer with us, but that's nothing out of the ordinary. Walker's board of directors believed that the management that takes you from $1 million to $25 million may not be the management that can take you from $25 million to $100 million."

He added that Walker is continuing plans to make a public offering in the near future, although he would not specify a date.

SHUGART from page 75

sources to the company's existing systems and copier/duplicator businesses, he said.

Shugart — which until recently employed almost 1,650, compared with a high of 3,900 employees in 1983 — manufactured disk drives for other vendors' microcomputers. The company is currently contacting customers to assess their needs, a Shugart spokesman said.

Letter of intent

Shugart has signed a letter of intent with Matsushita Communications Industrial Co., effective Feb. 15, to turn over most of Shugart's 5¼-in. floppy disk drive business to Matsushita, which currently manufactures the products for Shugart offshore. Matsushita will make the 5¼-in. disk drives available in the U.S. through its affiliate, Panasonic Industrial Co., the spokesman said.

Xerox officials are now negotiating with several unnamed companies for the sale of other Shugart product lines, including its 5¼- and 8-in. rigid disk drives. Depending on these negotiations and on Shugart's assessment of customer requirements, Xerox will begin to phase out its remaining unsold product lines, beginning with Shugart's 3½-in. disk drives, Lamb said. Xerox will continue manufacturing and distributing Shugart's 8-in. drives for a limited time and will continue to meet Shugart's warranty and service obligations to customers, according to a Xerox spokesman.

According to James N. Porter, president of Disk/Trend, Inc., a statistical market study firm based in Los Altos, Calif., Shugart's problems began three years ago when it failed to ship significant new products in a market that was becoming increasingly glutted with Japanese and domestic competitors — notably Tandon Corp. and Seagate Technology, Inc. He said several key products were either never produced or were released too late to be effective.

Severe price erosions

Robert Gaskin, a senior analyst at Dataquest, Inc. in San Jose, Calif., said Shugart, after originally dominating the 8-in. floppy disk drive market in 1982, failed to produce new 5¼-in. floppy- and hard-disk products while domestic and international competitors flooded the market and caused severe price erosions that reached 30% last year.

Additionally, Gavilan Computer Corp., Shugart's largest OEM customer of its 3½-in. microfloppy disk drive, filed for bankruptcy under Chapter 11 of the Federal Bankruptcy Act last year, and Shugart's key management and engineering staff gradually left for outside opportunities, "afraid of Xerox's corporate shadow" contributing to the decline.

Shugart was founded by former Memorex Corp. engineer Alan F. Shugart, who left the company early in its history to start Seagate Technology in Scotts Valley, Calif.

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Chip makers take steps to cut costs, fend off slump

SANTA CLARA, Calif. — In the wake of National Semiconductor Corp.'s decision to shut down production for two weeks in February [CW, Jan. 14], many other chip makers, keeping a tight rein on profit margins and overhead, are trying to control costs and ride out the industry slump.

Intel Corp., based here, tightened its belt by extending its Christmas holiday shutdown at its three local manufacturing plants. Intel also recently instituted a hiring freeze that allows for replacement only of essential employees, but has no current plans for layoffs, spokeswoman Rebecca Wallo said. "We would not rule them out if conditions continue to deteriorate, however," she noted.

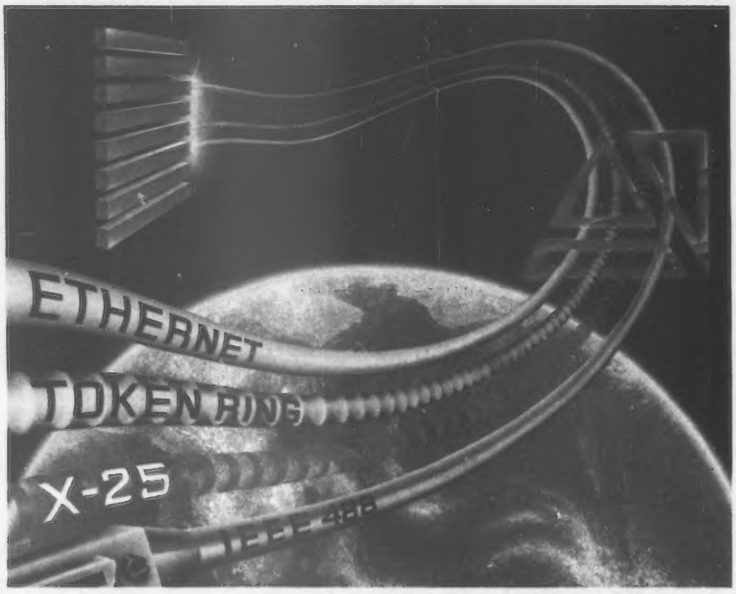
Signetics Corp. has cut spending, slowed hiring and may consider layoffs among its 4,000 employees here and in Sunnyvale, Calif., if the situation worsens. "Layoffs are a last-resort option if a rebound doesn't happen by the second quarter," spokesman Rick Cotta said.

To weather the slowdown, Austin, Texas-based Texas Instruments, Inc. plans to lay off 2,000 employees this month, primarily in its Texas plants, and is considering a reduced workweek for assembly line employees, TI's Norman Neuwriter said. The industry's recovery, he added, is based on a three-part equation: how quickly customers use up excess inventory, how quickly customer demand rebounds (based largely on end-user demand for computer products) and the amount of additional on-line production capacity.

At this point, customers have stopped canceling orders but have not increased their buying, according to Gary Arnold, an executive vice-president at National Semi. He said the company expects no upturn until the year's second quarter.

Bucking the cutback trend, Advanced Micro Devices, Inc. (AMD) of Sunnyvale said it had no cost-cutting plans. "We have a no layoff policy, and we're still hiring," spokesman Elliott Sopkin said. There are no plans to cut back R&D or capital expenditures during 1985, he said, adding that AMD's newest plant in Austin is operating one of its production areas at full capacity, and new fabrication plants are planned for San Antonio and a still-undetermined European country by 1986.

The LAN's IBM Mainframe Connection



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CHIP from page 75

the 1981 recession, when chip makers struggled to avoid massive employee layoffs and capital expenditure cutbacks, a policy that paid off later when companies had to meet the explosive demand for semiconductors in 1983. This demand, however, created today's problems. Because of the chip shortage, customers "double-ordered" huge amounts of chips in "a panic buying situation" to boost inventories, resulting in a glut of chips in the warehouses of chip users and causing demand to drop, Sandow said.

Most analysts agree that recovery is based on how quickly OEMs work down their inventories. "It'll take them six months to work through their excess inventory," noted Mary Wu, a semiconductor analyst at Gnostic Concepts, Inc. in Palo Alto, Calif.

Wu noted that most chip makers feel that no long-term recession is developing for the industry because the nation's key economic indicators — usually a sign of the industry's health — are stable.

HP from page 75

Verley said start-ups avidly seek seasoned HP managers for their staffs to improve a sometimes shaky Wall Street image, to strengthen a position with investors and to lay the groundwork for future top-level recruitment from the same company.

He noted that no major changes are planned for HP's corporate benefits package, nor is the company unduly concerned about the defections. "A few defections will always happen," he explained. "We've always felt our compensation and benefits package, and the opportunities for growth and self-expression we offer here are equal to anybody's." HP's senior management turnover rate was 5.1% for 1984, lower than average for the Silicon Valley, he said.

Targeted as one of the best-managed companies in the country in two recent best-selling books, HP is a premier candidate for hungry recruiters, according to Tony Price, a recruiter with Russ Reynolds Associates in San Francisco. Price, who helped convince Ely to leave HP for Convergent Technologies, called HP "the Procter & Gamble of business executive training," with an entrepreneurially oriented, small-group milieu that yields executives capable of producing immediate results for a start-up's financial or administrative problems.

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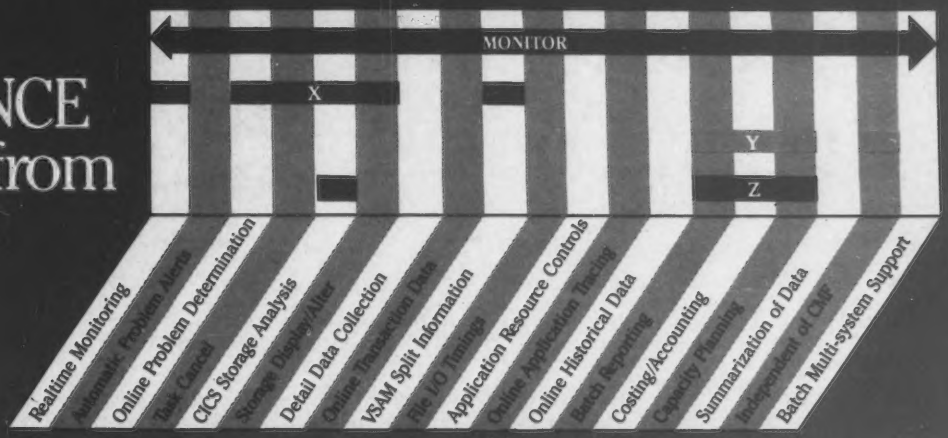

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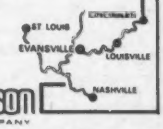

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Min 5 yrs. solid systems programming exp. with IBM MVS/SP, TSO, CICS with working knowledge of VS/1, NCP/VTAM, RCAF or ACF2 or Top-Secret and some database experience. Degree required.

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3-6 yrs. experience including: preparation of manuals used within a DP installation, preparation of user manuals and maintenance of system or programming standards and procedures manuals. Ability to gather information from diverse sources and arrange it in a logical and readily understandable manner. Knowledge of the terminology associated with structured techniques highly desirable. Programming and systems analysis experience desirable in an IBM VS-1 or MVS installation.

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data processing

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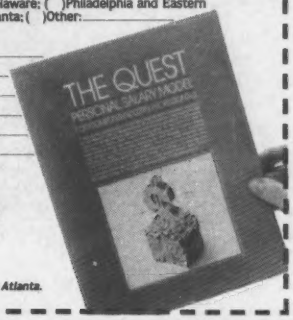

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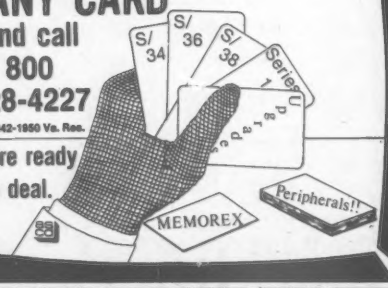

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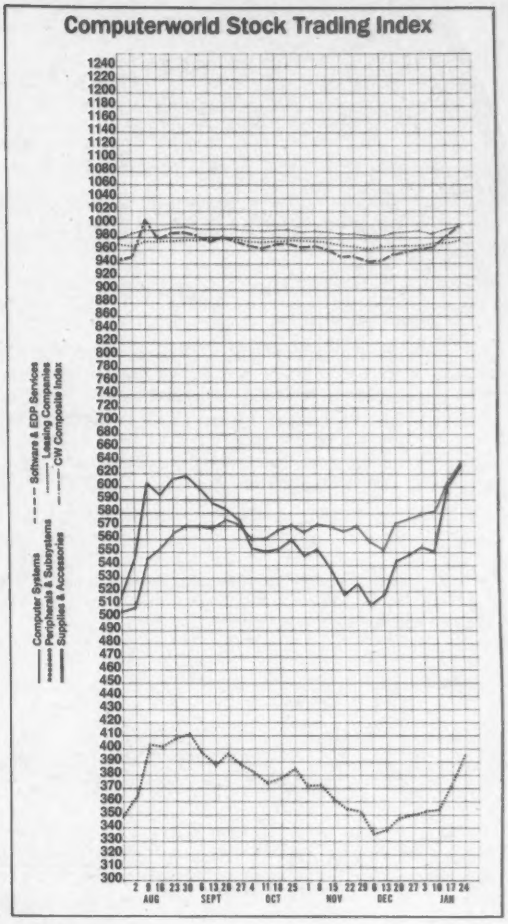

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		1984-85 RANGE (1)	CLOSE Jan 23 1985	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	6- 24	7	- 5/8	-8.1
O	ALTOS COMPUTER SYST	7- 21	9 3/8	- 3/8	-3.8
A	AMDAHL CORP	10- 30	15 1/2	+1	+6.8
O	APPLE COMPUTER INC	18- 83	29 3/8	- 5/8	-2.0
N	AT&T	19- 22	21 5/8	+1	+4.8
N	BURROUGHS CORP	31- 82	62 3/8	+1 1/8	+1.8
O	COMPAQ COMPUTER CP	6- 15	8	+ 3/8	+4.6
O	COMPUTER AUTOMATION	3- 17	6 1/8	+1 5/8	+36.1
A	COMPUTER CONSOLES	3- 26	12 1/8	- 1/8	-1.0
N	CONTROL DATA CORP	25- 62	36 1/8	+ 3/4	+2.1
O	CONVERGENT TECHNOL	5- 31	9 7/8	- 1/4	-2.7
N	CRAY RESEARCH INC	38- 83	63	+4 3/4	+8.1
O	DAISY SYSTEMS CORP	14- 31	31	+3 3/4	+13.7
N	DATA GENERAL CORP	27- 62	54 3/4	+3 5/8	+8.5
N	DATAPOINT CORP	14- 31	21	- 1/2	-2.3
N	DIGITAL EQUIPMENT	64-125	114 3/8	+2 3/8	+2.1
A	EXCEL INC	12- 16	15 3/8	- 1/4	-1.5
N	ELECTRONIC ASSOC.	3- 15	3 5/8	+ 1/2	+16.0
N	FLOATING POINT SYST	13- 42	28 1/4	+2 7/8	+12.2
N	FOXBORO	28- 47	30 1/2	+1 1/8	+3.8
N	GENERAL AUTOMATION	5- 16	6 1/2	+ 1/4	+4.0
N	GOULD INC	20- 48	28 3/8	+3 5/8	+15.0
N	HARRIS CORP	23- 48	31 1/2	+ 7/8	+2.3
N	HEWLETT-PACKARD CO	31- 48	32 7/8	-3 1/4	-8.7
N	HONEYWELL INC	46- 88	60 3/4	+2 1/4	+3.8
N	IBM	103-134	132 1/2	+8 5/8	+6.9
N	IPL SYSTEMS INC	1- 16	2 3/8	- 1/4	-9.5
N	ITT CORP	21- 47	31 7/8	- 3/8	-1.1
N	M/A-COM INC	13- 35	22 1/2	+2 7/8	+14.6
O	MANAGEMENT ASSIST	8- 28	25 1/2	- 1/8	-0.4
N	MATHEMATICA ELECTRONI	38- 80	62 3/4	+ 1/4	+0.3
N	MODULAR COMPUTER SYS	6- 16	8	+ 5/8	+8.4
N	MOHAWK DATA SCI	9- 17	12	0	0.0
N	MOTOROLA INC	28- 48	37 1/8	+1 7/8	+5.3
N	NAT'L SEMICONDUCTOR	11- 20	13	+ 1/2	+4.0
N	NBI INC	15- 36	16 3/8	- 1/2	-2.9
N	NCR	21- 34	28 3/4	+2	+7.5
N	PERKIN-ELMER	18- 37	27 1/2	+1 1/4	+4.7
N	PRIME COMPUTER INC	11- 28	18 3/4	+2	+11.9
N	SPERRY CORP	35- 58	48 7/8	+4 1/4	+9.5
O	STRATUS COMPUTER INC	8- 17	13 1/4	+2	+17.7
O	TANDEM COMPUTERS INC	15- 40	24 7/8	+2 3/8	+11.7
N	TANDY CORP	24- 62	27 7/8	+2 3/4	+10.9
O	TELEVIDEO SYSTEMS	3- 6	4	+ 1/4	+6.6
N	TEL XON CORP	8- 18	17 1/2	- 1/4	-1.4
N	TEXAS INSTRUMENTS	101-169	131 3/4	+5 3/4	+4.5
A	ULTIMATE CORP	10- 24	10	-1 1/4	-11.1
O	VECTOR GRAPHICS INC	0- 9	3/8	+ 1/8	+38.8
N	WANG LABS "B"	23- 62	27 7/8	+3 7/8	+16.1
A	WANG LABS "C"	23- 62	27 1/2	+3 1/8	+12.8
N	XEROX CORP	39- 92	63 3/8	+3	+7.4

LEASING COMPANIES

O	BOOTHE FINANCIAL CP	10- 22	22 3/8	0	0.0
A	CAI CORP	4- 10	8	+ 1/8	+1.4
N	COMDISCO INC	9- 42	14 5/8	+1 3/8	+10.3
O	CONTINENTAL INFO SYS	5- 20	7 5/8	+1 1/8	+17.0
N	DPF INC	10- 17	15 3/4	- 7/8	-5.2
N	FINANCO GROUP INC	10- 22	4 1/4	+ 1/2	+13.3
O	PHOENIX-AMERICAN INC	3- 17	3 3/4	+ 1/2	+15.3
O	REVCOMM INC	0- 21	10 3/8	+ 5/8	+6.4
N	U.S. LEASING	28- 44	38	+1 1/8	+2.9

COMPONENTS

N	ADVANCED MICRO DEV	25- 41	35	+2 1/4	+6.8
O	ADV'D SEMICONDUCTOR	15- 38	18 1/4	+ 1/2	+2.8
N	ANALOG DEVICES INC	20- 32	28 3/4	+1 3/8	+5.4
O	ANALOGIC CORP	10- 31	15	+1 1/2	+13.0
N	APPLIED MAGNETICS CP	9- 37	11 3/8	+ 1/4	+2.2
O	MAXCH CORP	5- 12	9 1/4	+ 1/4	+4.5
O	MICRO MASK INC	10- 18	11 1/2	+ 7/8	+8.2
N	TERADYNE	22- 38	31 5/8	+3 3/8	+11.8

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST 8TH OF A

SOFTWARE & EDP SERVICES

		1984-85 RANGE (1)	CLOSE Jan 23 1985	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	2- 8	2 1/4	0	0.0
N	ADVANCED SYSTEMS INC	8- 22	12 1/4	+1 1/2	+13.8
O	AGS COMPUTERS INC	10- 32	16 7/8	+1 5/8	+10.6
O	AMERICAN SOFTWARE	12- 31	17	+ 1/4	+1.4
N	AMACOMP INC	2- 18	2 3/4	+ 7/8	+46.6
O	ANALYSTS INTL CORP	5- 17	7	+ 3/4	+12.0
A	APPLIED DATA RES	18- 37	32 7/8	+2 5/8	+8.6
O	ASHTON TATE	6- 15	8	+ 3/4	+10.3
N	ASK COMPUTER SYSTEMS	13- 21	20 1/4	+1 1/2	+8.0
A	ASTRADYNE COMP IND	1- 7	1 3/8	0	0.0
A	AUTOMATIC DATA PROC	30- 44	43	+2 3/8	+5.8
O	COMPUTER ASSOC INT'L	15- 35	22 1/4	+ 3/4	+3.4
O	COMPUTER HORIZONS	8- 20	8 1/2	+1 1/4	+17.2
O	COMPUTER NETWORK	5- 11	8 1/2	- 1/2	-5.5
N	COMPUTER SCIENCES	11- 23	18 1/4	- 3/8	-2.3
O	COMPUTER TASK GROUP	12- 19	17 3/8	+2 3/8	+17.7
O	COMPUTER USAGE	1- 16	1	0	0.0
O	COMPUTONE SYSTEMS	4- 23	7 3/8	+1 3/4	+29.1
O	COMSERV CORP	1- 18	3 1/4	+ 1/4	+8.3
O	COMSHARE	8- 14	7 3/8	0	0.0
A	CULLINET SOFTWARE	12- 25	27 1/4	+2 7/8	+11.7
O	CYPRESS SYSTEMS INC	16- 25	22 1/2	+ 1/2	+2.2
O	DIGIAN SYSTEMS INC	7- 27	7 3/8	+ 1/4	+3.5
A	GENERAL ELECTRIC CO	45- 64	64 1/4	+5 1/4	+8.8
N	GTE CORP	38- 48	45 7/8	+1 7/8	+4.4
N	INFORMATICS GENERAL	14- 32	18 3/4	+1 1/4	+7.1
O	INFORMATION SCIENCE	4- 17	4 1/2	+ 1/4	+5.9
O	INFOTRON SYSTEMS CP	15- 43	22 1/2	- 1/4	-1.0
O	KRAUT ASSOCIATES	8- 15	12 3/4	+1 3/4	+15.9
A	LOGICON	18- 31	28 1/4	+1 3/4	+6.6
O	LOTUS DEVELOPMENT CP	15- 40	27 3/4	+2 1/2	+9.8
O	MCI COMMUNICATIONS	6- 28	8 3/4	+ 3/4	+9.2
O	MGDT SCI AMER INC	6- 33	12 7/8	- 1/8	-0.9
O	MATHEMATICAL APP GRP	6- 18	8 1/2	- 1/2	-5.5
O	MICOM SYSTEMS INC	27- 90	33 1/4	+1 5/8	+5.1
O	MICROPRO INT'L CP	2- 10	2 5/8	- 3/8	-12.5
N	NATIONAL DATA CORP	6- 28	8 3/4	+ 3/4	+9.3
O	ON-LINE SOFTWARE INT	4- 28	5 3/4	0	0.0
O	PARADYNE CORP	11- 20	17	+1 1/8	+7.0
A	PLANNING RESEARCH	10- 21	14 5/8	+ 5/8	+4.4
O	POLICY MGMT SYSTS CP	22- 35	28 1/4	+1	+3.8
O	PROGRAMMING & SYS	4- 6	5 1/4	+ 3/4	+16.8
O	REYNOLDS & REYNOLDS	28- 52	37 3/4	0	0.0
O	SCI COMP INT'L	10- 24	14 7/8	+ 7/8	+6.2
O	SHARED MEDICAL SYST	23- 43	28 1/2	- 1/4	-0.8
O	SCIENTIFIC COMPUTERS	5- 14	5 1/4	0	0.0
O	SOFTWARE AG	5- 15	15 3/4	+ 3/8	+2.0
N	URS CORP	10- 18	12 5/8	- 1/8	-0.9
N	UCCEL	7- 17	14 7/8	+ 3/4	+5.3

PERIPHERALS & SUBSYSTEMS

P	AM INTERNATIONAL	2- 7	3 3/4	0	0.0
A	ANDERSON JACOBSON	2- 26	3 1/2	- 3/8	-9.8
O	AUTO-TRAIN TECHNOLOGY	8- 29	11	+1 1/4	+12.8
O	AVANT-GARDE COMPUTNG	11- 28	16 1/2	+2 3/8	+16.8
O	CANCTEC INC	5- 22	7 1/4	0	0.0
A	CENTRONICS INT'L	1- 11	5/8	0	0.0
N	COMPUTERFAIRS & MEM	17- 30	25 7/8	+1 1/2	+6.1
O	CONRAC CORP	1- 3	1 7/8	0	0.0
A	CONTRAVISION LTD ADR	7- 12	8		
A	CORNUCOPIA SYSTS CORP	4- 20	9 1/8	0	0.0

COMPUTER SYSTEMS

		1984-85 RANGE (1)	CLOSE Jan 23 1985	WEEK NET CHNGE	WEEK PCT CHNGE
A	COMPUGRAPHIC CORP	28- 40	29 3/4	- 1/8	-0.4
O	COMPUTER TRANSCEIVER	1- 10	1	+ 1/8	+14.2
N	COMPUTERVISION CORP	28- 53	40 1/4	+2 3/8	+6.1
N	CONRAC CORP	11- 24	13 5/8	- 7/8	-6.0
A	DATAPRODUCTS CORP	14- 32	18 3/8	+1 1/2	+8.8
N	DATRAN CORP	4- 12	5 7/8	+1	+20.5
O	DATA SWITCH CORP	5- 41	6	+ 3/8	+6.5
O	DATUM INC	5- 17	7 1/8	+ 1/4	+3.6
O	DECISION DATA COMPUT	9- 17	15 5/8	+2	+13.6
N	DOCUTEL-OLIVETTI	4- 38	4 5/8	0	0.0
N	ELECTRONIC M & M	3- 11	5 3/8	+ 3/8	+7.5
O	ENDATA, INC	6- 18	6 3/4	+ 5/8	+10.2
O	EVANS & SUTHERLAND	11- 90	19 1/4	+ 3/4	+5.1
O	GANDALF TECHNOLOGIES	5- 14	12 1/2	+ 3/4	+6.3
N	GEN'L DATA COMM IND	10- 20	18 1/2	+1 1/8	+6.1
N	HAZELTINE CORP	18- 33	28	+2 1/4	+8.7
O	ICOT CORP	3- 8	4 3/8	+ 3/8	+9.3
O	INFORMATION INTL INC	10- 18	12 3/4	+ 3/4	+5.7
O	INTECOM INC	7- 21	10 3/8	+ 3/4	+7.7
O	INTEL CORP	27- 45	31 1/2	+ 1/2	+1.6
A	LUNDY ELECTRONICS	7- 15	11 3/8	+ 3/4	+7.0
O	MEGADATA CORP	3- 8	5 3/4	+1 1/4	+17.9
A	MEI DATA CORP	8- 23	10 3/4	+ 1/4	+2.3
N	MOHAWK CORP	19- 29	28	+ 1/8	+0.4
O	NETWORK SYSTEMS CORP	16- 34	25 3/4	+2 3/4	+11.9
N	NO AMERICAN PHILIPS	30- 41	41 1/4	+3 1/4	+8.5
N	NORTHERN TELECOM LTD	30- 48	37 3/8	+3 5/8	+10.7
O	ONEX	1- 6	1/8	0	0.0
O	PARADYNE CORP	11- 28	16 1/2	+2	+13.7
A	PENRIL CORP	8- 14	12 7/8	+ 1/2	+4.0
N	PLESSEY CO (ADR)	22- 41	31 5/8	+ 1/8	+0.5
O	PRINTRONIX INC	12- 34	18	0	0.0
O	RANTEC CORP	4- 23	5 3/8	- 1/4	-4.4
A	RECOGNITION EQUIP	10- 17	15 1/8	+1 3/8	+10.0
N	SANDERS ASSOCIATES	32-120	35 3/4	- 1/2	-1.3
O	SIAK TRON CORP	8- 19	13 1/2	0	0.0
A	SCIENTIFIC ATLANTA	8- 23	12 1/8	+ 3/8	+3.1
O	SFAWGATE TECHNOLOGY	4- 20	6 3/4	- 5/8	-8.4
N	STORAGE TECHNOLOGY	2- 23	3 1/2	+1 1/4	+33.3
O	SYKES DATATRONICS	1- 13	1 1/8	+ 3/8	+83.5
O	SYSTEMS & COMP TECH	11- 38	11	-2 3/4	-20.0
A	T BAR INC	7- 17	8 3/4	+ 5/8	+7.8
O	TAB PRODUCTS CO	13- 20	16	+ 1/4	+1.5
O	TANDON CORP	8- 35	6 5/8	-1 1/4	-15.8
A	TEC INC	8- 12	8 1/8	+ 1/2	+6.7
N	TEKTRONIX INC	32- 67	61 1/2	+2 1/8	+3.5
N	TELEX	18- 41	41 3/8	+3 1/8	+8.1
O	TESDATA SYSTEMS CP	2- 17	1 3/4	- 1/8	-6.6
N	TIMEPLEX INC	13- 23	20 1/2	+1 1/2	+7.8
O	VIRTUAL TECHNOLOGY	2- 28	2	+ 1/2	+33.3

SUPPLIES & ACCESSORIES

N	AMERICAN BIO PRODS	17- 23	22 3/8	+1 1/8	+5.2
O	BARRY WRIGHT	21- 33	28 1/2	+2 1/2	+10.4
A	DUPLEX PRODUCTS INC	22- 29	28 9/8	+ 7/8	+3.1
N	FANIE BUS. FORMS	18- 34	34	+2 3/8	+7.5
N	3M COMPANY	68- 90	84 3/8	+2 3/8	+3.2
A	MOORE CORP LTD	35- 51	48 3/8	+2 1/8	+4.5
O	STANDARD REGISTER	27- 48	48	0	0.0
N	WALLACE COMP SERVICE	23- 35	35 3/8	+2 5/8	+8.0

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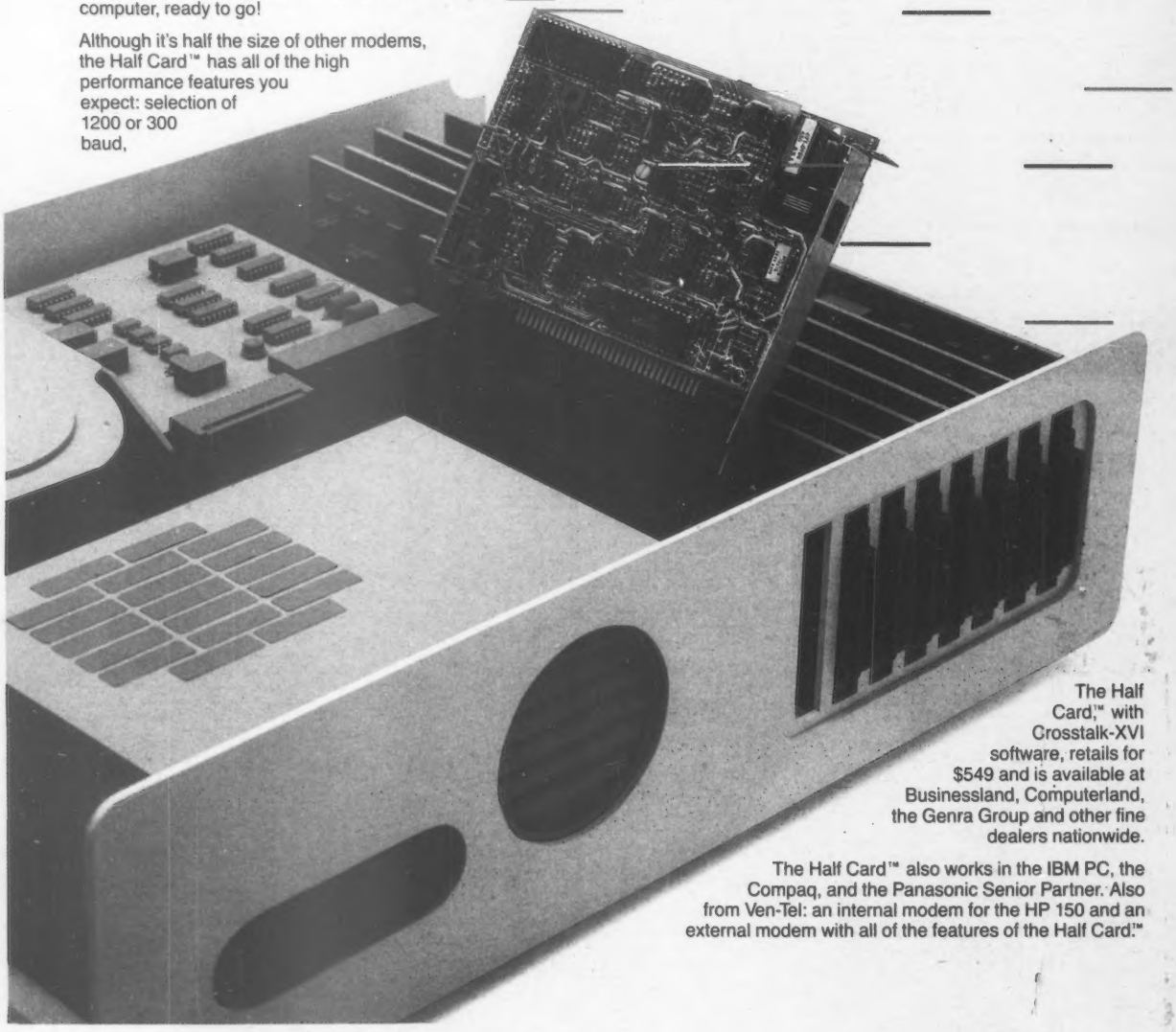

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